INSTRUCTION MANUAL

MODEL 430
TRANSMISSION
MULTIMETER

WAVETEK

INSTRUCTION MANUAL

MODEL 430 TRANSMISSION MULTIMETER

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Model 430 Digital Transmission Multimeter

SECTION 1
INTRODUCTION

1.1 THE MODEL 430

The Model 430 Transmission Multimeter measures signal level (dBm), noise (dBrn), frequency, capacitance, ac and dc voltage, dc current and resistance. It provides the capability of a level meter, noise meter, capacitance meter, frequency meter and multimeter all in one chassis, with direct digital readout of measurements.

The measurement of capacitance on an open unterminated line is direct and simple. Attach the two wires of the line to the input test jacks and read capacitance in a fraction of a second.

By using the pushbutton selectors, a rapid survey of level, noise, frequency, current, Vac and Vdc conditions on an operating line may be made. Capacitance and resistance measurements require an inoperative line.

Received tones or noise may be heard either through the built-in speaker or headset jack on the front panel.

Two automatic ranges and automatic polarity, as required, are furnished on all but signal level and noise measurements; the latter are provided with two manually selected ranges, selectable impedance terminations or bridging and, for noise measurements, selectable filters.

The instrument can be operated with its own rechargeable NiCad batteries or with 115 to 230 Vac, 50 or 60 Hz line power.

Indicating pushbutton selector switches provide for selection of all operating modes, impedance terminations and filters. The instrument is well adapted for measurements on voice, program and low speed and medium speed data channels (up to 50 kilobits per second).

Along with 0.1 dBm resolution in level and noise modes, the instrument provides extremely high input balance, typically 70 dB at 60 Hz and 55 to 60 dB up to 6 kHz. The gas discharge display is clear and bright and readable in direct sunlight. Mounted in a rugged, portable case with hinged front cover, the unit is well adapted for either field use or in-plant troubleshooting activity.

The instrument provides a fast reading rate to permit easy interpretation and viewing of changing signal levels. Auxiliary filters are available to smooth out input data for best viewing.

Additional features include a speaker and headset jack for audible signal monitoring, readout damping for value "averaging", line frequency filtering, dial-and-hold switches and handset jack and terminals for seizing the line under test.

A power cord and dual banana plug/alligator clip test lead are a part of this instrument.

1.2 THE MODEL 430-I

The Model 430-I is identical to the Model 430 except CCITT psophometric and program filters are used in place of the C-message and 3 kHz flat filters, and the line power damping filter is centered at 50 Hz rather than 60 Hz.

1.3 SPECIFICATIONS

1.3.1 Versatility

Signal level (dBm), noise (dBrn), frequency, capacitance, ac and dc voltage, dc current and resistance measurement capability.

Two automatic ranges on all but signal level and noise; two selectable ranges on signal level and two selectable ranges plus three selectable filters on noise. Out-of-range indicator lamp for signal level and noise. Readout damping selectable; 60 Hz filtering selectable when measuring noise and level.

Controls for dial-and-hold of line under test.

Three impedance terminations plus bridging and noise-to-ground.

1.3.2 Measurement

Signal Level (dBm)
Dynamic Range: −70 to +15.
Primary Ranges: −50 to −20 and −20 to +10.

Expanded Ranges: −70 to −20 and −20 to +15.
Frequency Range: Primary 50 Hz to 50 kHz.
Expanded Range: 20 Hz to 100 kHz.
Detector Response: Averaging.
Resolution: 0.1 dB.
Accuracy: At 25°C ±5°C (see figure 1-1). For 0°C to 50°C multiply accuracy by 1.5.

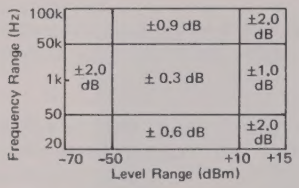


Figure 1-1. Accuracy Matrix

Noise Metallic (dBrn)
Dynamic Range: +80 to 0.
Primary Ranges: +80 to +50 ±1 dB; +50 to +20 ±1 dB.
Expanded Ranges: +85 to +50 ±1.5 dB; +50 to 0 ±2 dB.
Detector Response: Quasi rms.
Resolution: 0.1 dB.
Weighting Filters: C-message, 3 kHz Flat and 15 kHz Flat.

Noise-to-Ground (dBrn)
Dynamic Range: +120 to +40.
Primary Ranges: +120 to +90 ±1.5 dB; +90 to +60 ±1.5 dB.
Expanded Ranges: +125 to +90 ±2.0 dB; +90 to +40 ±3.0 dB.

Frequency
0.019 to 1.999 kHz ±4 Hz.
Resolution: 1 Hz.
1.999 to 19.99 kHz ±50 Hz.
Resolution: 10 Hz.
Minimum Detectable Level: −30 dBm.

Capacitance
0.0001 to 0.1999 μF ±1%.
Resolution: 0.0001.
0.1999 to 1.999 μF ±1%.
Resolution: 0.001.
(A low frequency technique is used that allows capacitance measurement on loaded or unloaded cable with moderate shunt leakage and power influence present.)

Vac
0 to 19.99V ±1% FS; 19.99 to 199.9V ±1% FS.
Bandwidth: 50 Hz to 10 kHz.

Vdc
0 to 19.99V ±0.1% FS ±0.1% of reading.
19.99 to 199.9V to ±0.1% FS ±0.1% of reading.

Kilohms
0 to 1.999 kΩ ±0.1% FS ±0.1% of reading.
1.999 to 19.99 kΩ ±0.1% FS ±0.1% of reading.

Milliamperes
0 to 19.99 mA ±0.1% FS ±0.1% of reading.
19.99 to 199.9 mA ±0.1% FS ±0.1% of reading.

1.3.3 Input Impedance

For dBm and dBrn: Pushbutton selectable 135Ω, 600Ω, 900Ω, and high Z bridging with less than 0.3 dB error at 900Ω and 0.2 dB error at 600Ω from 100 Hz to 10 kHz. Bridging Z is 50 kΩ nominal and is calibrated to read reference to 600Ω. Level, noise and frequency inputs are isolated by a balanced transformer.

For Vac: 1 MΩ.
For Vdc: 1 MΩ.
For mAdc: 1Ω and 10Ω shunts.
For Capacitance: 10Ω and 100Ω shunts.

1.3.4 Display

Planar gas discharge display, readable in direct sunlight. 1999 count resolution, with analog and digital processor ICs utilizing a charge-balancing integrating technique. Automatic polarity indication. Overload indication by blinking readout if 1999 count is exceeded.
Display Update Rate: 5/second.
Signal Sampling Rate: 5/second.
Autorange Time: 0.2/second.

1.3.5 AC Power Effect

AC power ±10%: Less than 0.1 dB.

1.3.6 Longitudinal Balance and Voltage Rejection (CMRR)

Meets specifications of Bell 41009.

1.3.7 Overload Protection/Maximum Input

Vdc: To ±500 Vdc or ac peak.
mA: Fused to 0.5 amp.
kΩ: To 125 ac rms or ±180 Vdc.
dBm: +30 dBm level signal.
dBrn: +120 dBm level signal.
μF: Protected against ring signal or ±180 Vdc.

1.3.8 Features

Noise Filter
High-pass filter, greater than 25 dB down at 60 Hz (per Bell specification 41009).

Damping Filter
Low-pass filter (normal mode rejection filter), approximately 50 dB down at 60 Hz.

Input Jacks
Banana and 310. Clip posts available for auxiliary handset.

Noise Monitor
Speaker with volume control and 310 jack for headset.

Holding Coil
Pushbutton controlled, 2 henries, 170Ω (not to be used for resistance and capacitance tests).

CAUTION

Holding coil must be used when making measurements on lines operating from 48V station battery. Hold function automatically inserts dc blocking capacitors.

Uncal Lamp
Flashes to indicate out-of-range high or low on noise and level measurement.

1.3.9 Power

Rechargeable NiCad battery with 6 hour continuous operation life. BATT LO lamp indicates ½ hour of operation remaining. 115 and 230 Vac, 50 to 60 Hz.

1.3.10 Mechanical

Height: 15 cm (6 in.); Width: 28 cm (11¼ in); Depth: 34 cm (13½ in).
Weight: 6.8 kg (15 lb) net; 7.7 kg (17 lb) shipping.

1.3.11 Model 430-I

The 430-I is for international applications. It has a CCITT psophometric filter in place of the C-message filter. In addition, the LF damping filter is centered at 50 Hz.

SECTION 2
INSTALLATION AND OPERATION

2.1 UNPACKING INSPECTION

After carefully unpacking the instrument, visually inspect the external parts for damage to surface areas, etc. If damage is discovered, file a claim with the carrier who transported the instrument. Retain the shipping container and packing material for use in case reshipment is required.

2.2 PREPARATION FOR USE

Loosen the bail knobs and rotate the bail away from the front cover. Unlatch and open the front cover; then position and tighten the bail for the desired instrument tilt.

2.2.1 Initial Operation With Line Power

Inspect the plug on the power cord to ensure that it will mate with the line receptacle. (The power cord is normally stored in the instrument cover.) Check for a tag or other paper work indicating the voltage range for line power. If your line power is in this range, proceed to paragraph 2.2.2. If the instrument setup for line power cannot be verified or if you desire to change it, the chassis must be removed from the case for access to a line power voltage switch at the rear of the instrument.

1. Remove the four perimeter screws from the front panel and lift the chassis out.
2. Find the 115/230 switch on the rear circuit board. Select the value nearest the line voltage to be used.
3. Reassemble the instrument by guiding the two alignment pins on the case into their receptacles on the chassis.
4. Ensure that the front panel fuse is correct according to the switch setting.

2.2.2 Operation With Battery Power

Check the battery charge by pressing the ON/OFF switch to illuminate the display. If the BATT LO lamp does not flash, the battery charge is sufficient for operation. Turn the instrument off, when not in use, to conserve power.

2.2.3 Test Connections

Either a dual banana plug or a 310 plug may be used to make connection between the circuit under test and the instrument. Termination impedance is selectable for level and noise measurements and should most nearly match the characteristic impedance of the line under test. Bridging is selectable when the line under test is to be terminated elsewhere.

2.3 ELECTRICAL ACCEPTANCE CHECK

The steps that follow provide a quick checkout of instrument operation. If electrical deficiencies exist, refer to the Warranty in the front of this manual. The following test equipment, or equivalent, is recommended for performing this electrical inspection. (Refer to Operating Controls and figure 3-1 for control descriptions.)

- Wavetek Model 420 transmitter or an oscillator with selectable dBm attenuation and output impedance of 135, 600 or 900 ohms.
- DC voltage source and a resistor of known value (for a 0 to 200 mA current loop) or a source of current in the 0 to 200 mA range.
- Capacitor of known value (0.0001 to 2 μF).

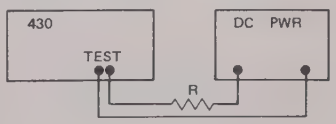
NOTE

Depressed switches will be white; extended switches will be black, except the ON/OFF switch, which is red when depressed.

1. Prepare the Model 430 for use with either line power or with battery power (refer to paragraph 2.2).

Ammeter Check

2. Connect the dc voltage source, resistor and the 430 in series.



3. Press ON/OFF and mA DC switches and ensure the other switches are extended.

   Observe: The expected mA value (in the 0 to 200 mA range).

DC Voltmeter Check

4. Press the DCV switch. This places a 1 MΩ resistance in series with the resistor.

   Observe: The expected Vdc value across the 1 MΩ.

Ohmmeter Check

5. Open the leads from the 430 and press the kΩ switch.

   Observe: Blinking display (the display value is meaningless).

6. Short the leads.

   Observe: A near zero reading (1 or 2 digits).

Capacitance Meter Check

7. Connect the leads to the known capacitor and press the μF switch.

   Observe: The expected capacitance value.

Frequency Meter Check

8. Connect the 430 to the output of the oscillator and press the kHz switch.

9. Turn the oscillator on and set for 1 kHz, 0 dBm.

   Observe: An approximately 1 kHz reading on the 430.

AC Voltmeter Check

10. Press the ACV switch on the 430.

    Observe: The following value for the given output impedance of the oscillator.

600Ω	−1.55 Vac
900Ω	−1.90 Vac

Level Meter Check

11. Press the IMPEDANCE TERMINATION switch that will match the oscillator impedance. Press the +10/−20 dBm LEVEL switch on the 430.

    Observe: A near 0 dBm reading on the 430.

12. Press the −20/−50 dBm LEVEL switch.

    Observe: The UNCAL lamp flashes.

13. Set the oscillator output level to −30 dBm.

    Observe: A near −30 dBm reading on the 430.

60 Hz Filter Check

14. Set the oscillator frequency to 60 Hz.

    Observe: The 430 reading.

15. Press the FILTER switch.

    Observe: A decrease in reading value and the UNCAL lamp may flash.

16. Slowly increase the oscillator frequency to 1 kHz.

    Observe: An increase in dBm up to about 250 Hz, then a leveling off to −30 dBm from 400 Hz to 1 kHz.

Speaker and Headset Jack Check

17. Press to release the FILTER switch. Set the oscillator output level to −10 dBm. Press the SPKR switch.

    Observe: That a 1 kHz tone comes from the speaker.

18. Press the +80/−50 NOISE switch.

    Observe: That a 1 kHz tone comes from the speaker.

19. Vary the VOLUME knob.

    Observe: That the knob controls the speaker volume.

20. Plug a headset into the MONITOR jack.

    Observe: That a 1 kHz tone comes from the headset.

DIAL Connector Check

21. Press to release the SPKR switch. Connect a handset to the DIAL connector or terminals and press the DIAL switch.

    Observe: That a 1 kHz tone comes from the handset.

Noise Meter Check

22. Set the oscillator output level to −30 dBm. Remove the handset. Press to release the DIAL switch, press

the +80/+50 dBrn NOISE switch and press the C NOISE FILTER switch.

Observe: A near +60 dBrnC reading.

23. Press the +50/+20 dBrn NOISE switch.

Observe: The UNCAL lamp flashes.

24. Set the oscillator output level to −40 dBm.

Observe: A near +50 dBrnC reading.

Noise Filter Check

25. Press the 3K NOISE FILTER switch.

Observe: A near +50 dBrn reading.

26. Press the 15K NOISE FILTER switch.

Observe: A near +50 dBrn reading.

27. Set the oscillator to 15 kHz.

Observe: A near +47 dBrn reading.

28. Press the 3K NOISE FILTER switch.

Observe: A near +37 dBrn reading.

29. Press the C NOISE FILTER switch.

Observe: A near +17 dBrn reading.

Noise-to-Ground Check

30. Connect the oscillator across a TEST connector and the GND connector. Press the Ng switch and the +120/+90 dBrn NOISE switch.

31. Set the oscillator to 1 kHz, +10 dBm at 600Ω.

Observe: A near +106 dBm.

32. Press the +90/+60 dBrn NOISE switch.

Observe: The UNCAL lamp flashes.

Holding Coil Check

33. Disconnect leads to the 430. Press the kΩ and HOLD switches.

Observe: A near 0.170 kΩ value. This is the holding coil internally placed across the TEST terminals.

SECTION 3
OPERATION

3.1 CONTROLS AND CONNECTORS

The following control and connector descriptions are keyed to figure 3-1.

NOTE

Depressed switches are white, except for the ON/OFF switch, which is red. pressing a measurement mode switch releases all other measurement mode switches; that is, they are mutually exclusive. IMPEDANCE TERMINATION and Ng switches and also the NOISE FILTER switches operate in the same fashion. All other switches may be individually pressed to release.

1. **ON/OFF Switch and BATT LO Lamp** — Controls power applied to all circuits except the battery charging circuit, which is permanently connected to the line cord receptacle. The digital display is illuminated when power is on. If line power is not connected to the 430 and the ON/OFF switch is on, the BATT LO lamp will flash, if there is less than ½ hour of operation life remaining in the rechargeable battery.

2. **Digital Display** — Displays an up to 4 digit value and ± sign when the ON/OFF switch is on. The display value has a 0000 to 1999 range. When the measurement exceeds 199.9 mA, V or kΩ, the display blinks on and off.

3. **AMPS—VOLTS—OHMS and CAP—FREQ Switches** — Select the measurement mode with the following range: 0 to 199.9 mA, Vdc and Vac and 0 to 19.99 kΩ.

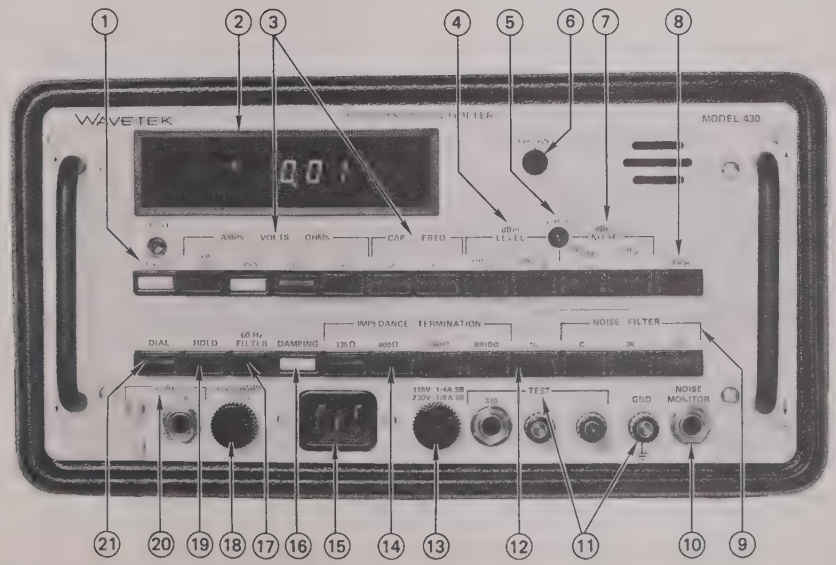


Figure 3-1. Model 430 Front Panel

4. **dBm LEVEL Switches** — Either switch selects the signal level measurement mode: either +10 to −20 or −20 to −50 dBm range. Out-of-range signals cause the UNCAL lamp to flash, indicating that the reading accuracy is degraded (in proportion to amount out of range).

5. **UNCAL Lamp** — Flashes when LEVEL or NOISE input signals are either above or below the selected range. When flashing, the reading accuracy is degraded and not specified.

6. **VOL Control** — Controls speaker and noise monitor headset (at MONITOR jack) output volume.

7. **dBrn NOISE** — Either switch selects the noise (metallic) measurement mode: +80 to +50 or +50 to +20 dBrn range. If the Ng switch is also depressed, the measurement mode will be noise-to-ground in +120 to +90 or +90 to +60 dBrn range (noise metallic and noise-to-ground measurements also require different input connections). Out-of-range signals cause the UNCAL lamp to flash, indicating that the reading accuracy is degraded (in proportion to the amount out of range).

8. **SPKR Switch** — Makes the input signals in the audible range audible.

9. **NOISE FILTER Switches** — Select one of three standard response curves for noise weighting: C-message, 3 kHz flat and 15 kHz flat (per Bell specification 41009).

10. **NOISE MONITOR Jack** — Permits headset monitoring of noise.

11. **TEST 310, TEST and GND Connectors** — The TEST connectors and the TEST 310 connector are in parallel and provide for either banana plug or 310 plug input connection. The GND connector is primarily for noise-to-ground measurements where the two conductors of the line under test are shorted and noise is measured from the conductors to telephone ground.

12. **Ng Switch** — In conjunction with a NOISE switch, allows a measurement of noise between the TEST connectors, or the TEST 310 conductors, and the GND connector.

13. **FUSE Housing** — Rotate the cap ccw for access to the fuse. The correct fuse value is determined by the setting of the line voltage switch (inside the instrument case) position:

115 Vac	1/4 amp SB
230 Vac	1/8 amp SB

14. **IMPEDANCE TERMINATION Switches** — For LEVEL and NOISE measurements. The impedance between the two TEST connectors (or the two conductors of the TEST 310 connector) can be selected to be 135, 600 or 900 ohms or BRIDG (approximately 50 kΩ) for bridging external impedances.

15. **Power Receptacle** — Accepts the furnished power cord.

16. **DAMPING Switch** — Damps a rapidly changing display for an "average" level readout.

17. **FILTER Switch** — A high pass filter for "masking" 60 Hz line frequency input. Used in level and noise measurements only.

18. **Milliamp Fuse** —Rotate the cap ccw for access to the ½ amp SB fuse.

19. **HOLD Switch** — When a handset connected at the DIAL connector is used to dial up a line via the line under test, depressing this switch seizes the dialed up line by placing a holding coil across it.

20. **DIAL Jack and Terminals** — For a handset 310 plug or alligator clips in order to dial up and hold lines via the line under test.

21. **DIAL Switch** — When pressed, the TEST terminals are disconnected from the measurement circuits and connected to the DIAL terminals (for handset access to the line under test).

3.2 BATTERY CARE

The Model 430 is normally equipped with rechargeable NiCad batteries which, when fully charged, give a continuous operational life of 6 hours. When a half hour or less of operating time remains on the battery, the BATT LO light flashes.

The battery is automatically charged when line power is connected to the 430, whether the ON/OFF switch is depressed or released, and the 430 may be operated while the battery is charging.

CAUTION

Complete discharge may ruin the battery.

When storing the 430 overnight, or for an extended period, connect it to line power to keep the battery charged.

3.3 GENERAL OPERATION

3.3.1 Using the Handset

A handset is necessary when a signal source or termination is to be remotely connected to the line under test.

1. Connect the line under test to the TEST connectors.

2. Connect the handset to the DIAL connector. Press the DIAL switch and dial the number of the source signal or termination.

3. Press the HOLD switch to seize the dialed up source or termination.

4. Press to release the DIAL switch in order to reconnect the measurement circuits to the line under test.

To hang up or release the seized line, all holding impedances must be removed. These include:

Model 430 holding coil (HOLD switch)
Model 430 measuring circuits input impedance
Handset holding impedance

1. Press the DIAL switch (thereby disconnecting the measuring circuits).
2. Press to release the HOLD switch (thereby disconnecting the holding coil).
3. Move the handset switch to OFF, if so equipped, or disconnect the handset from the 430.

NOTE

The DIAL switch must be pressed to release in order to connect the 430 input terminals to the measurement circuits.

3.3.2 Out-of-Range Readings

A reading made while the UNCAL lamp flashes or the readout blinks may be sufficiently accurate. However, it is not within the specifications given for the 430 (paragraph 1.3.2). UNCAL lamp will flash from −50 to −70 dBm. In noise mode, the UNCAL lamp will flash from +20 to 0 dBrnC. Accuracy is reduced to ±2 dBrnC. In Ng mode, the UNCAL lamp will flash from +60 to +40 dBrnC. Accuracy is reduced ±3.0 dBrnC.

Examine figure 1-1 for accuracy in level mode over +10 dBm level. The UNCAL lamp will flash from +10 to +15 dBm, but the accuracy is reduced as indicated in figure 1-1.

At all other levels, a flashing UNCAL lamp indicates that another range should be selected.

3.3.3 Damping

The DAMPING switch may be used in any of the measurement modes. It slows down the rate of change of the readout, giving an averaging effect to the value. The damping function here is exactly the same as with a moving needle meter.

3.3.4 Line Power Filtering

The FILTER switch is for use in the LEVEL and NOISE measurement modes. It is a low pass filter with maximum filtering (−26 dB) at line power frequency and no effect from 400 Hz up. Use this filter to diagnose measurement interference by line power and line power harmonics.

3.3.5 Noise Filter Selection

The noise filters (C-message, 3 kHz flat and 15 kHz flat) are noise weighting filters conforming to Bell specification 41009. The purpose of the filters is to permit noise measurements to be made on the same basis that noise is heard by the human ear (C-message weighting) or to facilitate noise analysis (3 kHz and 15 kHz flat weighting). The Model 430-I is equipped with CCITT psophometric and program filters.

3.4 MEASUREMENTS

The measurements given here are typical of the measurements that the Model 430 can make and should be used as a guide for similar measurements. As an aid, refer to paragraphs 1.3 and 3.1.

3.4.1 Typical Levels

The following levels are a typical guide to circuit performance.

Circuit Loss: Transmitted level minus received level — not over 10 dB.

Circuit Noise: Satisfactory — not over +20 dBrnC (where dBrnC is noise measured with the C-message filter).
Marginal — +21 to +30 dBrnC.
Immediate action required — over +30 dBrnC.

Noise-to-Ground: Satisfactory — not over +80 dBrnC.
Marginal — +81 to +90 dBrnC.
Immediate action required — over +90 dBrnC.

Circuit Balance (Noise-to-Ground Minus Circuit Noise):
Excellent — over 60 dB.
Good — between 60 and 50 dB.
Fair — between 50 and 40 dB.
Poor — less than 40 dB.

3.4.2 Received Level

Received level is the level in dBm of the signal received (1 mW into 600Ω = 0 dBrn).

1. Connect the line under test to the TEST connectors. Press the appropriate IMPEDANCE TERMINATION switch to match the characteristic impedance of the line or to bridge the already terminated line.

2. Insure that any transmitting source at the far end is correctly terminated also.

3. Connect or dial up a milliwatt source of desired check-out frequencies at the far end.

4. Press the ON/OFF switch and a LEVEL switch to make a dBm reading. If the UNCAL lamp flashes, press the other LEVEL switch. Observe the dBm level reading.

3.4.3 Insertion Loss

Insertion loss is the measurement of signal level with and without a device of any type inserted on the line under test. The difference in the two levels is the insertion loss. Perform the received level measurement with and without the device inserted. The insertion loss is the difference between the two dBm levels read.

3.4.4 Noise

Noise is the ratio of average power of undesired disturbance to a standard reference level. The 430 averages the power over the voice band in accordance with the weighting of the noise filter used (C-message, 3 kHz flat or 15 kHz flat).

3.4.4.1 Noise Metallic

Noise metallic is noise measured between the two conductors of a line.

1. Connect the line under test to the TEST connectors. Press the appropriate IMPEDANCE TERMINATION switch to match the characteristic impedance of the line or to bridge the already terminated line.

2. Terminate the far end of the line with the proper impedance for the line under test.

3. Press the desired NOISE FILTER switch (C, 3K or 15K), one of the NOISE range switches and the ON/OFF switch. If the UNCAL lamp flashes, press the other NOISE switch.

3.4.4.2 Noise-to-Ground

Noise-to-ground is a measure of longitudinal noise; that is, noise between the shorted conductors of a line and the telephone ground.

1. Connect the line under test to the TEST connectors. Press the Ng switch.

2. Terminate the far end of the line with the proper impedance for the circuit and connect GND to the telephone system ground.

3. Press the ON/OFF switch and one of the NOISE range switches. If the UNCAL lamp flashes, press the other NOISE switch. Observe the dBrn noise level. (This reading requires no adjustment. It is the true Ng value.) Ng ranges are indicated by red numerals and lettering.

3.4.5 Frequency — Tone Identification

Signal frequency measurements can be made to detect an unknown frequency or to check the frequency deviation of a known source.

1. Connect the open, unterminated cable pair under test to the TEST connectors.

2. Press the ON/OFF switch and the kHz switch. Observe the signal frequency. Signal frequency must exceed −30 dBm signal magnitude.

3.4.6 DC Current — Holding Current Check

The holding current being measured is actually short circuit hold current, approximately 30 mA.

1. Connect the line under test to the TEST connectors. Connect a handset to the DIAL connector.

2. Press the ON/OFF, mA - DC and DIAL switches. Dial an available number and press the HOLD switch when the phone rings; then press to release the DIAL switch. Observe short circuit holding current. Maximum current range is 200 mA. Do not place directly across station battery.

3.4.7 DC Voltage — Station Battery Check

Battery voltage is nominally −48 Vdc referenced to telephone ground.

1. Connect the line under test to the TEST connectors with the subscriber subset in on-hook condition.

2. Press the ON/OFF switch and the DCV switch. Observe the voltage readout.

3. With the subscriber subset off hook, voltage drops from −48 Vdc to about −7 to −10 Vdc. This is the voltage drop across the subscriber subset.

3.4.8 Capacitance — Open Fault Location or Line Length

The length of a pair of unterminated wires in a cable is proportional to their capacitance. If the cable pair capacitance per mile is known, the number of miles of cable or miles to an open fault is easily calculated.

1. Connect the open, unterminated cable pair under test to the TEST connectors.

2. Press the ON/OFF switch and the μF switch. Make sure the holding coil is released. Observe the cable pair capacitance. Press the damping switch.

3. Locate the capacitance value on the chart (figure 3-2). The cable length or length to fault will intersect the capacitance value at the characteristic capacitance curve for the cable or use this equation.

$$\text{Length in Miles} = \frac{\text{Capacitance Reading}}{\text{Capacitance Per Mile}}$$

3.4.9 Resistance — DC Loop or Shorted Fault Location

The length of a pair of shorted wires in a cable is proportional to their resistance. If the wire resistance per mile is known, the number of miles of cable or miles to a shorted fault is easily calculated.

1. Connect the cable pair under test to the TEST connectors.

2. Press the ON/OFF switch and the kΩ switch. Observe the cable pair resistance value.

NOTE

Press DAMPING button to settle reading. Long line measurements usually pick up power line interference.

3. Use figure 3-3 or this equality to determine the cable length or length to the fault.

$$\text{Length in Miles} = \frac{\text{Resistance Reading}}{\text{Ohms/Mile}}$$

Gauge and Loading	DC Resistance (ohms per mile)
26NL	440
26H88	448
24NL	274
24H88	282
22NL	172
22H88	180
19NL	85
19H88	93

3.4.10 AC Signal Voltage — AC Power Influence

The ACV function may be used to measure ac voltage levels on either terminated or unterminated lines. The magnitude of any longitudinal voltage may be observed by connecting the test jacks between one side or the other at the telephone line and telephone system ground. Measurement bandwidth is 50 Hz to 10 kHz up to 200 Vrms amplitude.

1. Connect the line under test to the TEST connectors.

2. Press the ON/OFF switch and the ACV switch. Observe the voltage on the line.

NOTE

The input impedance is 1 MΩ and thereby provides a bridging measurement of ac voltage level.

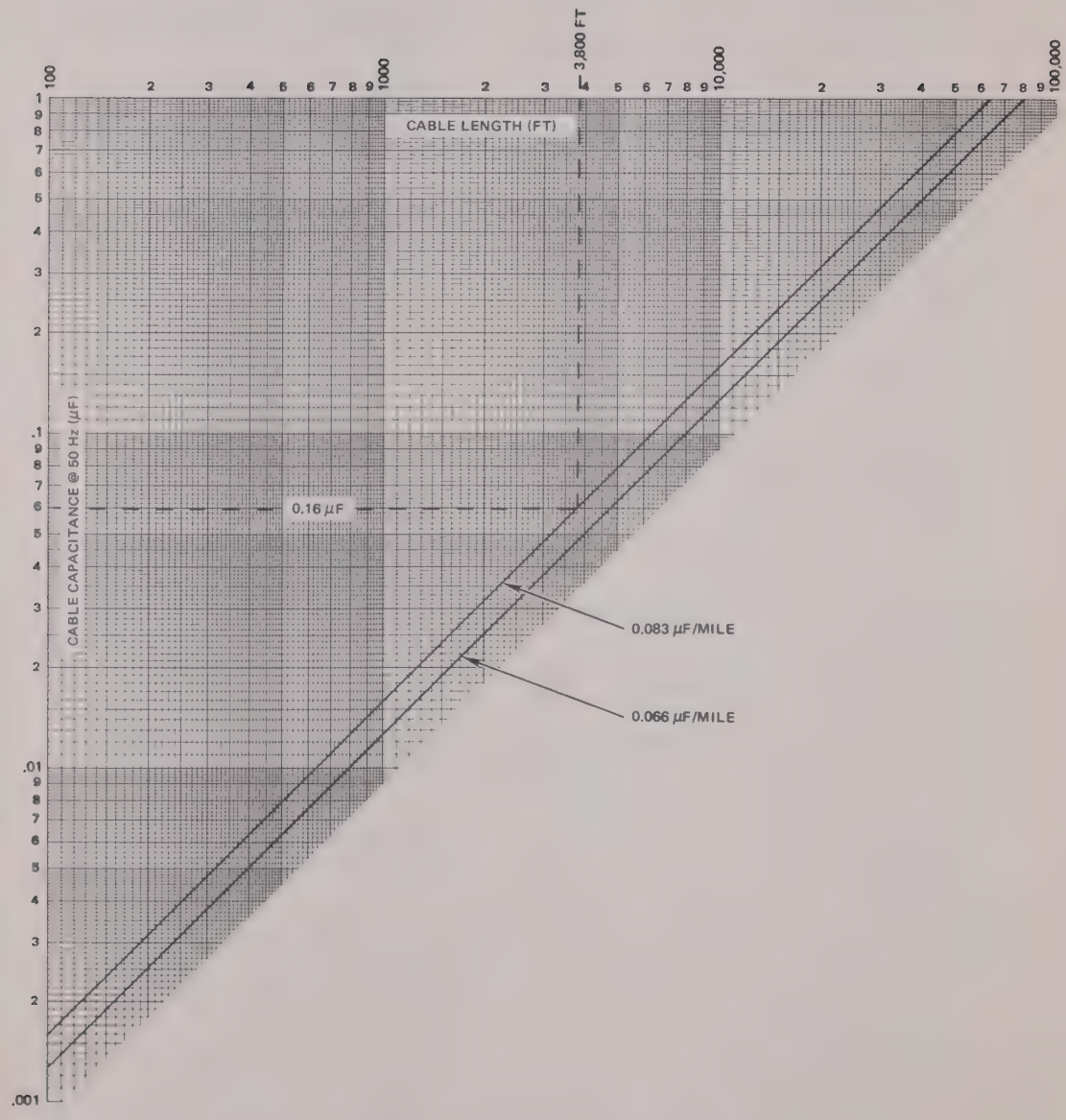


Figure 3-2. Capacitance Per Foot Chart

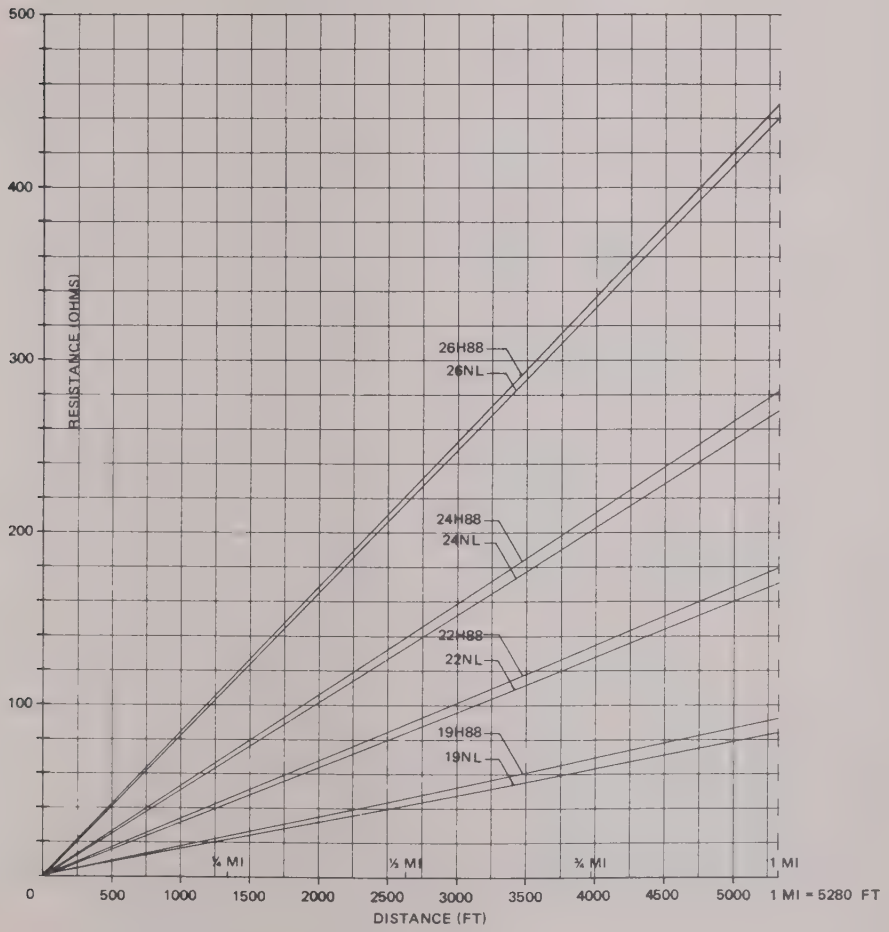


Figure 3-3. DC Resistance Per Cable Length

SECTION 4
CALIBRATION

4.1 ORGANIZATION

The calibration procedure consists of 14 independent adjustments or verifications:

Paragraph		Paragraph	
4.4	Power Supplies	4.11	Input Termination
4.5	DC Voltmeter	4.12	AC Voltage Converter and AC Volts
4.6	DC Volts	4.13	Log Amplifier
4.7	DC Milliamps	4.14	Scaling Amplifier
4.8	Kilohms	4.15	Noise-to-Ground
4.9	Microfarads	4.16	Uncal Monitor
4.10	Kilohertz		
		4.17	Battery Low Monitor

4.2 TEST EQUIPMENT

Table 4-1 lists the test equipment requirements and gives typical or recommended test equipment.

Table 4-1. Recommended Test Equipment

Tester	Range	Recommended Instrument
DC Voltage Source		Cohn 334A
AC Voltage Source	0 to 200 Vac	Optimation AC104A
Current Source	0 to 200 mAdc	Valhalla Scientific 4004
Signal Frequency Generator	0 to 100 kHz*; +10 to −50 dB in 10 dB steps with 1 dB vernier; 135Ω, 600Ω and 900Ω output impedance; THD ⩽ 1%	Wavetek 420-S-438 Transmitter
Frequency Counter	0 to 50 kHz	Monsanto 101C
DCmA Ammeter and RMS Voltmeter		Fluke 8000A
Standard Resistors	1.900 kΩ 19.00 kΩ	
Standard Capacitors	1.990 μF 0.1990 μF	
Resistor with Clips or Female Amp Pins on Leads	10 kΩ, 1/8W, 1%	
DC Current Calibrator		Valhalla 2500

**100 kHz range is required to check the limits of frequency response.*

4.3 SETUP

1. Warm up the instrument for 20 minutes in the carrying case.
2. Prepare the unit for calibration by removing the four screws from the extreme corners of the front panel and lift chassis out of the case. Remove the two front mounting screws from the digital board (A1) support bar and loosen the two rear screws. Push back and lift front edge of digital board (A1) to gain access to function board (A2) beneath. Tighten the two rear mounting screws to hold the digital board (A1) in an uptilted position. Now all three boards will be accessible.

NOTES

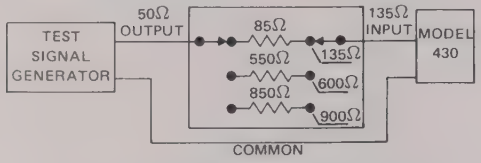
1. For simplicity, reference designations are used:

Digital Board	*A1*	*Filter Board*	*A3*
Function Board	*A2*	*Power Supply Board*	*A4*

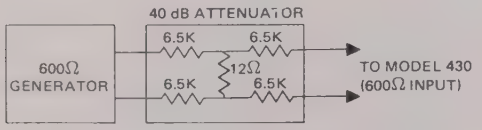
2. *For physical location of components and switch poles, see the designations on the printed circuit boards.*

3. *When calibrating the low ranges on multimeter functions, if the readout exceeds 19.99, the meter will automatically up range. If this occurs, down range the meter by injecting an input signal of less than 10.00 (in readout).*

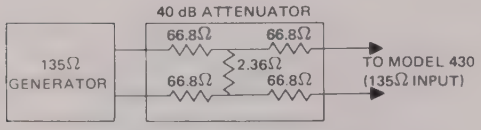
4. *If you use a test signal generator with 50Ω output impedance, an attenuator network may be improvised as follows:*



5. *A 40 dB attenuator network for a 600Ω output generator may be improvised as follows:*



6. *A 40 dB attenuator network for a 135Ω output generator may be improvised as follows:*



7. *The instrument can be calibrated with the ac power cord plugged in or, if fully charged, on batteries alone.*

4.4 POWER SUPPLIES

1. Switch 115V/230V switch (A4) to 115V.

2. Plug power cord into the front panel receptacle and the 115 Vac source.

3. Depress ON/OFF pushbutton.

4. Connect DVM (dc volts) to J3-4 (A4) and signal ground.

5. Verify or adjust R13 (A4) for +11.00 ±0.05 Vdc.

6. Connect DVM (dc volts) to J3-5 (A4).

7. Verify or adjust R13 (A4) for −11.00 ±0.05 Vdc.

8. Connect DVM (dc volts) to J3-8 (A4).

9. Verify voltage reading to be 5.00 ±0.05 Vdc.

10. Connect DVM (dc volts, 200V range) to junction of R41 and R42 (A1).

11. Verify voltage reading to be 170.0 ±5.0 Vdc.

4.5 DC VOLTMETER

1. Press to release ON/OFF pushbutton.

2. Unsolder and lift inboard end of R20 (619K) (A1) and one end of C38 (30 pF) (A1).

3. Apply 0 Vdc to lifted end of R20 using outboard lead of C7 (0.1 mF) (A1) as common.

4. Depress ON/OFF and mA - DC pushbuttons.

5. Adjust C5 (A1) for 0.00 readout ±0.05 Vdc.

6. Depress DCV pushbutton.

7. Verify or readjust C5 (A1) for 0.00 readout ±0.02 Vdc.

8. Depress mA - DC pushbutton.

9. Change voltage input from 0.00 to +0.1900 Vdc.

10. Verify or adjust R11 (A1) for +19.00 readout (low range).

11. Depress DCV pushbutton.

12. Change voltage input from +0.1900 Vdc to +1.900 Vdc.

13. Verify or adjust R17 (A1) for +190.0 readout (high range).

14. Reduce voltage input to 0 Vdc and disconnect.

NOTE

It may be necessary to momentarily overrange input to autorange to the high range.

15. Release ON/OFF pushbutton.

16. Resolder R20 and C38 (A1).

17. Depress ON/OFF pushbutton.

18. Short TEST binding posts to each other.

19. Readjust C5 (A1) for 0.00 readout.

20. Remove short.

4.6 DC VOLTS

1. Connect dc voltage source to TEST and set source for ±19.90 Vdc.

2. Verify or adjust R8 (A2) for ±19.90 readout.

NOTE

If reading shows as 19.9, reduce input to less than 1.0 volt and bring up to 19.90 volts.

3. Change dc voltage source setting to ±199.0 Vdc.

4. Verify or adjust R6 (A2) for ±199.0 readout.

5. Reduce dc voltage source to zero; then disconnect from TEST binding posts.

4.7 DC MILLIAMPS

1. Depress mA - DC pushbutton.

2. Short TEST binding posts to each other.

3. Verify or adjust R133 (A2) for 0.00 readout.

4. Remove short.

5. Connect output of dc voltage source to dc current calibrator input.

6. Depress 10 mA pushbutton on current calibrator.

7. Connect current calibrator output to Model 430 TEST connectors and ensure fuse is in place.

8. Set dc voltage source to ±1.990 Vdc.

9. Verify or adjust R132 (A2) for ±19.90 readout.

10. Depress 100 mA pushbutton on current calibrator.

11. Verify or adjust R138 (A2) for ±199.0 readout.

12. Depress dc current calibrator 1 μA pushbutton.

13. Reduce dc voltage source to 0V, remove Model 430 input connections and disconnect voltage source from current calibrator.

4.8 KILOHMS

1. Depress kΩ pushbutton.

2. Short TEST binding posts to each other.

3. Verify or adjust R24 (A2) for .000 readout.

4. Remove short.

5. Connect 1.900 kΩ standard resistor to TEST binding posts.

6. Verify or adjust R15 (A2) for 1.900 readout.

NOTE

If reading shows as 1.90, depress ACV button; then depress kΩ button to get proper resolution of 1.900.

7. Replace 1.900 kΩ with 19.00 kΩ standard resistor.

8. Verify or adjust R19 (A2) for 19.00 readout.

9. Remove standard resistor.

10. Repeat steps 2 thru 9 once.

4.9 MICROFARADS

1. Depress μF and DAMPING pushbuttons.

2. Verify or adjust R107 (A2) for .0000 readout ±0.0003.

3. Connect oscilloscope X1 probe to switch S6E wiper (A2), using frontmost lead of C37 as common.

4. Oscilloscope settings are as follows:

   Input: DC Coupled
   Volt/cm Switch: 5 mV
   Time/cm Switch: 10 ms

5. Zero oscilloscope beam.

6. Verify or adjust R90 (A2) for minimum amplitude.

7. Readjust R107 (A2) for .0000 readout ±0.0005, if

necessary. This adjustment may cause oscilloscope trace to shift +5 to +8 mV.

8. A readjustment of R90 (A2) and R107 (A2) may be necessary to achieve minimum ac amplitude and minimum dc level shift while maintaining .0000 readout ±0.0005.

9. Disconnect scope probe.

10. Connect 1.990 μF standard capacitor to TEST binding posts.

11. Verify or adjust R101 (A2) for 1.990 readout.

12. Remove 1.990 μF standard capacitor. Instrument will automatically down range to low range with open input.

13. Connect 0.1990 μF standard capacitor to TEST binding posts.

14. Verify or adjust R89 for .1990 readout.

15. Remove 0.1990 μF standard capacitor.

4.10 KILOHERTZ

1. Depress kHz pushbutton.

2. Short TEST binding posts to each other.

3. Verify or adjust R54 (A2) for 0.000 readout ±0.001.

4. Remove short.

5. Connect frequency generator output and frequency counter input to TEST binding posts.

6. Set frequency generator to 1.990 kHz at 0 dBm. Verify frequency with frequency counter.

7. Verify or adjust R47 (A2) for 1.990 readout.

NOTE

If you inadvertently overrange, down range the instrument by lowering the input frequency below 0.9 kHz momentarily to make this adjustment.

8. Reduce frequency generator level to −30 dBm and check for 1.990 readout.

9. Increase frequency generator level to 0 dBm and set frequency to 19.90 kHz on frequency counter.

10. Verify or adjust R40 (A2) for 19.90 readout.

11. Reduce frequency generator level to −30 dBm and check for 19.90 readout.

12. Remove frequency generator and frequency counter from TEST binding posts.

4.11 INPUT TERMINATION

1. Depress +10/−20 and 600Ω pushbuttons.

2. Set signal frequency generator to 1 kHz, 0 dBm and 600Ω output termination.

3. Connect frequency generator output and DVM (ac volts) to TEST binding posts.

4. Verify or adjust R4 (A3) for 0.775 Vrms reading on DVM.

5. Depress 900Ω pushbutton on Model 430.

6. Set signal frequency generator termination to 900Ω.

7. Verify or adjust R8 (A3) for 0.948 Vrms reading on DVM.

8. Depress 135Ω pushbutton on Model 430.

9. Set signal frequency generator termination to 135Ω.

10. Verify or adjust R6 (A3) for 0.367 Vrms reading on DVM.

11. Set signal frequency generator termination to 600Ω.

12. Disconnect DVM and signal frequency generator leads.

13. Depress +120/+90, C and Ng pushbuttons.

14. Short TEST binding posts to each other.

15. Connect one lead of signal frequency generator output to shorted binding posts and other lead to adjacent GND binding post.

16. Connect DVM (ac volts) or dB level meter across shorted TEST posts and GND post. Note reading on DVM. It should be approximately 1.550 Vrms.

17. Move DVM (ac volts) test lead connected to shorted TEST posts to switch S21E wiper (A3).

18. Verify or adjust R61 (A3) for 40 dB less than observed

in step 16. (–40 dB ≈ 1/100; therefore, voltage is approximately 0.0155 Vrms.)

19. Remove signal frequency generator leads and DVM leads.

20. Depress +10/–20 level and 600Ω pushbuttons.

21. Connect signal frequency generator (still set at 1 kHz, 0 dBm and 600Ω termination) to TEST binding posts.

22. Connect DVM (ac volts) to TEST binding posts and note DVM reading (0.775 Vrms).

23. Disconnect DVM test leads and connect them to switch S15A wiper and signal ground at outboard end of R2 (A3).

24. Verify or adjust R15 (A3) for 0.012 Vrms (36 dB less than voltage reading observed in step 22.)

25. Disconnect DVM test lead and connect it to outboard lead of R42 (56.2K) (A3).

26. Verify or adjust R41 (A3) for a 0.775 Vrms reading on DVM.

27. Disconnect DVM leads.

4.12 AC VOLTAGE CONVERTER AND AC VOLTS

1. Release ON/OFF pushbutton.

2. On assembly A2, unsolder one end of the jumper mounted on bifurcated terminals between resistors R114 and R116.

3. Set oscilloscope controls for:

   Input: DC
   Volts/cm: 20 mV
   Time/cm: 0.5 ms
   Trigger: Internal Trigger

4. Zero oscilloscope beam.

5. Connect oscilloscope X 1 probe to rearmost jumper terminal described in step 2, using frontmost lead of C37 as common.

6. Set signal frequency generator to –30 dBm, 1 kHz and 600Ω impedance termination.

7. Depress ON/OFF pushbutton.

8. Verify or adjust R57 (A2) for an equal amplitude ac voltage (full wave rectified) displayed on oscilloscope screen.

9. Release ON/OFF pushbutton.

10. Disconnect oscilloscope probe and common, and resolder jumper to terminal.

11. Disconnect signal frequency generator leads.

12. Depress ON/OFF and ACV pushbuttons.

13. Short TEST binding posts to each other.

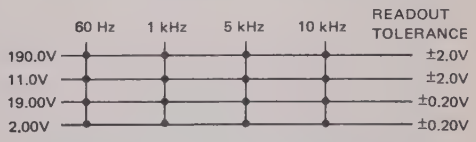
14. Verify or adjust R67 (A2) for 0.00 readout.

15. Remove short.

16. Connect ac voltage calibrator or ac voltage source and DVM to TEST binding posts.

17. Set ac voltage source to 190.0 Vac, 10 kHz.

18. Verify or adjust R80 (A2) for 190.0 readout. Other points in frequency spectrum and voltage range may be checked (see matrix).



19. Reduce ac voltage source to zero and disconnect leads.

4.13 LOG AMPLIFIER

1. Release ON/OFF pushbutton.

2. Connect 10 kΩ resistor between two terminals adjacent to IC9 (A2).

3. Connect DVM (mVdc) to frontmost terminal adjacent to IC9 (A2), which is pin 7 of IC9. Use frontmost lead of C37 as common.

4. Depress ACV and ON/OFF pushbuttons.

5. Verify or adjust R74 (A2) for 0.000 ±0.001V on DVM. If a zero adjustment cannot be reached, one of the flanking resistors R73 or R75 (A2) should be permanently shorted as required and R74 (A2) adjusted for zero.

6. Release ON/OFF pushbutton.

7. Disconnect 10 kΩ resistor and DVM.

8. Depress +10/−20, 600Ω and ON/OFF pushbuttons.

9. Set signal frequency generator to 0 dBm, 1 kHz and 600Ω termination.

10. Connect signal frequency generator to TEST binding posts.

11. Connect DVM (dc volts) to switch S4G wiper (A2), which is pin 10 of IC9 (A2), and ground. Use frontmost lead of C37 as common.

12. Verify or adjust R128 (A2) for 1.000 ±0.002 Vdc on DVM.

13. Verify or adjust R72 (A3) for 00.0 readout.

14. Set signal frequency generator to +10 dBm.

15. Verify or adjust R78 (A2) for +10.0 to +10.3 readout as follows. If readout is outside of +10.0 to +10.3 range, adjust R78 (A2) for reading even worse by amount equal to difference between +10.2 and reading observed.

16. Set signal frequency generator to 0 dBm.

17. Readjust R128 (A2) for 1.000 ±0.002 Vdc reading on DVM. Readout should show 0.00.

18. Recheck steps 14 thru 17 until +10.0 to +10.3 readout can be maintained between 0 and +10 dBm input; also between 0 and −10 dBm input while DVM reading equals 1.000 Vdc with 0 dBm input.

19. Disconnect DVM.

20. Set signal frequency generator to 0 dBm, 1 kHz and 600Ω impedance termination.

21. Verify or adjust R72 (A3) for 00.0 readout.

22. Depress BRIDG pushbutton.

23. Verify or adjust R80 (A3) for +06.0 readout.

24. Set signal frequency generator to 900Ω impedance termination.

25. Depress 900Ω pushbutton.

26. Verify or adjust R76 (A3) +00.0 readout.

27. Set signal frequency generator to 135Ω impedance termination.

28. Depress 135Ω pushbutton.

29. Verify or adjust R68 (A3) 00.0 readout.

4.14 SCALING AMPLIFIER

1. Depress +10/−20 and 600Ω pushbuttons.

2. Set signal frequency generator to −20 dBm, 1 kHz and 600Ω impedance termination.

3. Note readout, which should be −20.0 ±0.3 dBm.

4. Depress −20/−50 pushbutton.

5. Verify or adjust R112 (A2) for same reading noted in step 3.

6. Depress +80/+50 pushbutton.

7. Depress C pushbutton.

8. Set signal frequency generator to −10 dBm.

9. Verify or adjust R116 (A2) for +80.0 readout.

10. Set signal frequency generator to −40 dBm.

11. Note readout, which should be +50.0 ±0.3 dBm.

12. Depress +50/+20 pushbutton.

13. Verify or adjust R120 (A2) for the same reading noted in step 11.

14. Disconnect input leads from TEST binding posts.

4.15 NOISE-TO-GROUND

1. Depress +120/+90, C and Ng pushbuttons.

2. Short TEST binding posts to each other.

3. Set signal frequency generator to +10 dBm, 1 kHz and 600Ω impedance termination.

4. Connect one lead of signal frequency generator output to shorted TEST binding posts and other lead to adjacent GND post.

5. Verify or adjust R84 (A3) for +106.0 readout.

6. Disconnect short and leads.

4.16 UNCAL MONITOR

1. Depress +80/+50, 600Ω and C pushbuttons.
2. Set signal frequency generator to −10 dBm, 1 kHz and 600Ω impedance termination.
3. Connect DVM (dc volts) to the inboard side of R32 (A1) and ground, outboard side of C7 (A1).
4. Connect signal frequency generator output to TEST binding posts.
5. Verify or adjust R92 (A3) for −0.400 ±0.005 Vdc on DVM.
6. Disconnect DVM leads.
7. Depress 900Ω pushbutton.
8. Set signal frequency generator termination to 900Ω and adjust generator output for Model 430 readout of +81.0 (+0.3, −0 dBrn).
9. Verify or adjust R26 (A1) to turn on UNCAL.
10. Reset signal frequency generator for Model 430 readout of +80.0 (±0.5 dBrn).
11. Verify or adjust R26 (A1) to extinguish UNCAL.
12. Check for proper UNCAL operation at 600Ω and 900Ω impedance termination using table 4-2, block A ranges.
13. Depress +10/−20 and 600Ω pushbuttons.
14. Set signal frequency generator termination to 600Ω and adjust output for Model 430 readout of −22.0.
15. Verify or adjust R31 (A1) to light UNCAL.
16. Reset signal frequency generator for Model 430 readout of 21.0.
17. Verify or adjust R31 (A1) to extinguish UNCAL.
18. Check for proper UNCAL operation at 600Ω and 900Ω terminations using table 4-2, block B ranges.

Table 4-2. UNCAL Calibration Chart

Vary input signal level and note when UNCAL lights as level goes beyond top or bottom of range. Compare with values in chart.

RANGE	LEVEL (dBm) +10/−20	LEVEL (dBm) −20/−50	NOISE (dBrn) +80/+50	NOISE (dBrn) +50/0	Ng (dBrn) +120/+90	Ng (dBrn) +90/+60
	A				C	
When input signal level exceeds top of range →	+10	−20	+80	+50	+120	+90
UNCAL should turn on somewhere in this range →	+10.0 to +14.1	−20.0 to −16.0	+80.0 to +84.1	+50.0 to +54.1	+120.0 to +124.1	+90.0 to +94.1
	B				D	
When input signal level goes below bottom of range →	−20	−50	+50	+20	+90	+60
UNCAL should turn on somewhere in this range →	−20.1 to −24.0	−50.1 to −54.0	+49.9 to +46.0	+19.9 to +16.0	+89.9 to +86.0	+59.9 to +56.0

19. Depress 135Ω pushbutton.

20. Set signal frequency generator termination to 135Ω and adjust output for Model 430 readout of −22.0.

21. Verify or adjust R94 (A3) to turn on UNCAL.

22. Reset signal frequency generator for Model 430 readout of −21.0.

23. Verify or adjust R94 (A3) to extinguish UNCAL.

24. Check for proper UNCAL operation using table 4-2, block A and B ranges.

25. Remove the input leads.

26. Depress +120/+90, C and Ng pushbuttons.

27. Short TEST binding posts to each other.

28. Connect one lead of signal frequency generator to shorted TEST binding posts and other lead to adjacent GND post.

29. Set signal frequency generator to 1 kHz and 600Ω termination and adjust output for Model 430 readout of +88.0.

30. Verify or adjust R73 (A1) to turn on UNCAL.

31. Reset signal frequency generator for Model 430 readout of +89.0.

32. Verify or adjust R73 (A1) to extinguish UNCAL.

33. Check for proper UNCAL operation using table 4-2, block C and D ranges.

34. Disconnect leads and short.

4.17 LOW BATTERY MONITOR

1. Release ON/OFF pushbutton.

2. Unplug ac voltage power cord from power line source.

3. Disconnect red battery lead from BT1 (A4) Amp pin.

4. Remove fuse F1 (A4) from the clip holder.

5. Connect positive lead of dc voltage source to BT1 (A4) Amp pin and negative lead to negative lead of capacitor C1 (A4).

6. Set the dc voltage source to +24.1 Vdc.

7. Plug in ac voltage power cord.

8. Depress ON/OFF pushbutton.

9. Verify or adjust R58 (A1) for BATT LO light off.

10. Set dc voltage source to +24.0 Vdc.

11. Verify or adjust R58 (A1) for BATT LO light on.

12. Release ON/OFF pushbutton.

13. Unplug the ac power cord.

14. Adjust dc voltage source to zero; then disconnect dc voltage source.

15. Reconnect red battery lead to BT1 (A4) Amp pin.

16. Reinstall fuse.

4.17.1 Battery Charge Current

1. Unplug ac voltage power cord.

2. Release ON/OFF pushbutton.

3. Disconnect red battery lead from BT1 (A4) Amp pin.

4. Connect common lead of DVM (dc milliamps) to battery red lead and high lead to BT1 (A4) Amp pin.

5. Plug in ac voltage power cord.

6. Verify +80 ±3 mA on DVM.

7. Unplug ac voltage power cord.

8. Disconnect DVM test leads.

9. Connect battery red lead to BT1 (A4) Amp pin.

10. Plug in ac voltage power cord.

4.17.2 Dial and Hold Circuit

1. Release ON/OFF pushbutton.

2. Depress +10/−20 and 600Ω pushbuttons.

3. Connect DVM (kilohm) to TEST binding posts.

4. Verify DVM reading of 36Ω (transformer primary).

5. Depress DIAL pushbutton.
6. Temporarily short DIAL terminals to each other.
7. Verify DVM reading of 0.00Ω.
8. Disconnect short.
9. Depress HOLD pushbutton.
10. Verify DVM reading of 174Ω (holding coil).

SECTION 5
PARTS LISTS AND SCHEMATIC DIAGRAMS

5.1 DRAWINGS

The following assembly drawings (with parts lists) and schematics are in the arrangement shown below.

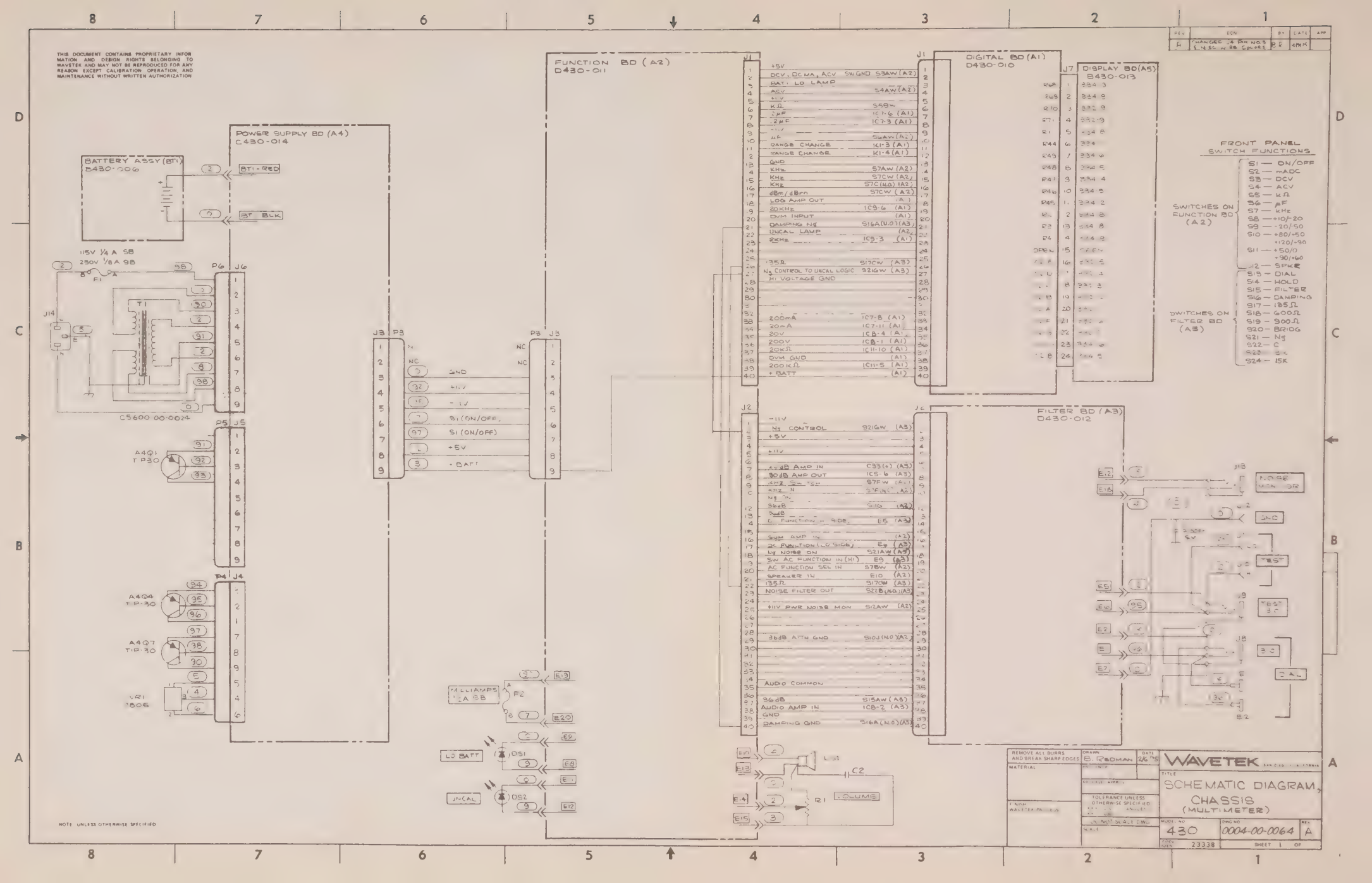
5.2 ORDERING PARTS

When ordering spare parts, please specify part number, circuit reference, board, serial number of unit and, if applicable, the function performed.

5.3 ADDENDA

Under Wavetek's product improvement program, the latest electronic designs and circuits are incorporated into each Wavetek instrument as quickly as development and testing permit. Because of the time needed to compose and print instruction manuals, it is not always possible to include the most recent changes in the initial printing. Whenever this occurs, addendum pages are prepared to summarize the changes made and are inserted immediately inside the rear cover. If no such pages exist, the manual is correct as printed.

Multimeter Schematic	0004-00-0064
Multimeter Parts List	1000-00-0064
Chassis Assembly	0102-00-0323
Chassis Parts List	1101-00-0064
Mode and Function Switch Block Diagram	430-201
Function Board Schematic	0103-00-0112
Function Board Assembly	0101-00-0112
Function Board Parts List	1100-00-0112
Filter Board Schematic	0103-00-0113
Filter Board Assembly	0101-00-0113
Filter Board Parts List	1100-00-0113
Digital Board Schematic	0103-00-0111
Digital Board Assembly	0101-00-0111
Digital Board Parts List	1100-00-0111
Display Board Schematic	(See Digital Board Schematic)
Display Board Assembly	0101-00-0114
Display Board Parts List	1100-00-0114
Power Supply Board Schematic	0103-00-0115
Power Supply Board Assembly	0101-00-0115
Power Supply Board Parts List	1100-00-0115
Battery Schematic	(see Power Supply Board Schematic)
Battery Assembly	0101-00-0110
Battery Parts List	1100-00-0110


THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION OPERATION AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION
REV ECN BY DATE APP
A CHANGED J & P# NOS & MISC NOTES 2 R 4 MAR
POWER SUPPLY BD (A4) C430-014
BATTERY ASSY (BT1) B430-006
BT1-RED
BT BLK
115V 1/4 A SB
230V 1/8 A SB
F1
T1
J14
P6 J6
C5600 00-0024
P5 J5
A4Q1 TIP30
P4 J4
A4Q4 TIP-30
A4Q7 TIP-30
VR1 1805
FUNCTION BD (A2) D430-011
P3 J3
GND
+11V
-11V
S1 (ON/OFF)
S1 (ON/OFF)
+5V
+BATT
J1
+5V
DCV, DCMA, ACV SWGND S3AW (A2)
BAT LO LAMP
ACV S4AW (A2)
+11V
KΩ S5BW
.2MF IC7-6 (A1)
.2MF IC7-3 (A1)
-11V
µF S6AW (A2)
RANGE CHANGE K1-3 (A1)
RANGE CHANGE K1-4 (A1)
GND
KHz S7AW (A2)
KHz S7CW (A2)
KHz S7C (N.O.) (A2)
dBm/dBrn S7CW (A2)
LOG AMP OUT (A1)
20KHz IC9-6 (A1)
DVM INPUT (A1)
DAMPING NG S16A (N.O.) (A3)
UNCAL LAMP (A2)
2KHz IC9-3 (A1)
135Ω S17CW (A3)
Ng CONTROL TO UNCAL LOGIC S21GW (A3)
HI VOLTAGE GND
200mA IC7-8 (A1)
20mA IC7-11 (A1)
20V IC8-4 (A1)
200V IC8-1 (A1)
20KΩ IC11-10 (A1)
DVM GND (A1)
200KΩ IC11-5 (A1)
+BATT (A1)
DIGITAL BD (A1) D430-010
J7 DISPLAY BD (A5) B430-013
R48 R49 R50 R51 R1 R44 R43 R48 R47 R46 R45 R22 R4 OPEN
J2
-11V
Ng CONTROL S21GW (A3)
+5V
+11V
6dB AMP IN C33 (+) (A3)
30dB AMP OUT IC5-6 (A3)
KHz SW "ON" S7FW (A2)
KHz N S7FNC (A2)
Ng IN
36dB S1G (A2)
3dB
DC FUNCTION IN 30dB E5 (A3)
SUM AMP IN (A2)
DC FUNCTION (NO SIG) E4 (A3)
Ng NOISE ON S21AW (A3)
SW AC FUNCTION IN (HI) E9 (A3)
AC FUNCTION SEL IN S7BW (A2)
SPEAKER IN E10 (A2)
135Ω S17W (A3)
NOISE FILTER OUT S27B (N.O.) (A3)
11V PWR NOISE MON S12AW (A2)
36dB ATTN GND S10J (N.O.) (A2)
AUDIO COMMON
36dB S15AW (A2)
AUDIO AMP IN IC8-2 (A3)
GND
DAMPING GND S16A (N.O.) (A3)
FILTER BD (A3) D430-012
J18
J8
J9
NOISE MON OR
SNC
TEST
TEST 3C
3C
2AL
E2
FRONT PANEL SWITCH FUNCTIONS
SWITCHES ON FUNCTION BD (A2)
S1 — ON/OFF
S2 — mADC
S3 — DCV
S4 — ACV
S5 — kΩ
S6 — µF
S7 — kHz
S8 — +10/-20
S9 — -20/+50
S10 — +80/+50 +120/-90
S11 — +50/0 +90/+60
S12 — SPKR
SWITCHES ON FILTER BD (A3)
S13 — DIAL
S14 — HOLD
S15 — FILTER
S16 — DAMPING
S17 — 135Ω
S18 — 600Ω
S19 — 900Ω
S20 — BRIDG
S21 — Ng
S22 — C
S23 — 5K
S24 — 15K
MILLIAMPS 1.2A SB
F2
LO BATT
OS1
UNCAL
OS2
L1
C2
R1
VOLUME
NOTE UNLESS OTHERWISE SPECIFIED
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH
DRAWN B. ROSMAN
DATE 2/6/75
TOLERANCE UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DWG
WAVETEK SAN DIEGO, CALIFORNIA
TITLE SCHEMATIC DIAGRAM, CHASSIS (MULTIMETER)
MODEL NO 430
DWG NO 0004-00-0064
REV A
CAGE CODE 23338
SHEET 1 OF

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	DWG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	SCHEMATIC, MULTIMETER	0004-00-00A4	WVTK	0004-00-00A4	1
NONE	BATTERY	430-006	WVTK	1100-00-0110A	1
NONE	DIGITAL	430-010	WVTK	1100-00-0111R	1
NONE	FUNCTION	430-011	WVTK	1100-00-0112	1
NONE	FILTER	430-012	WVTK	1100-00-0113	1
NONE	DISPLAY	430-013	WVTK	1100-00-0114	1
NONE	POWER	430-014	WVTK	1100-00-0115R	1
NONE	STD CHASSIS	430-000	WVTK	1101-00-00A4	1

WAVETEK PARTS LIST	TITLE MOD 430 TRANSMISSION MULTIMETER	ASSEMBLY NO 1000-00-00A4 PAGE: 1	REV

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PRO/ENGR		TITLE: PARTS LIST MODEL 430
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		MODEL NO 430 / DWG NO 1000-00-0064 / REV
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET OF
	SCALE		

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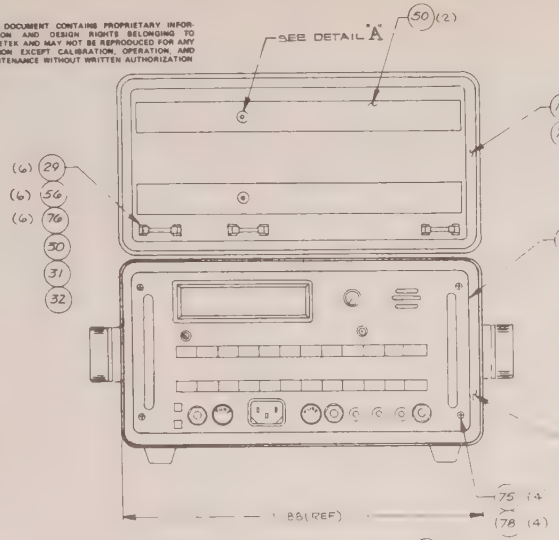
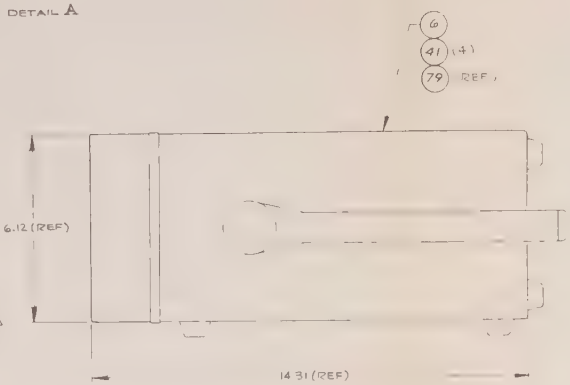
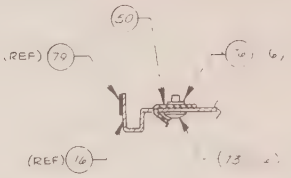
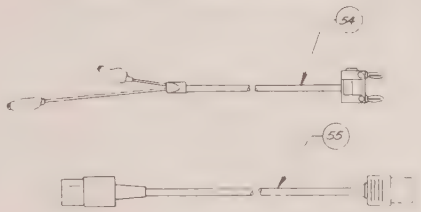
REV	ECN	BY	DATE	APP

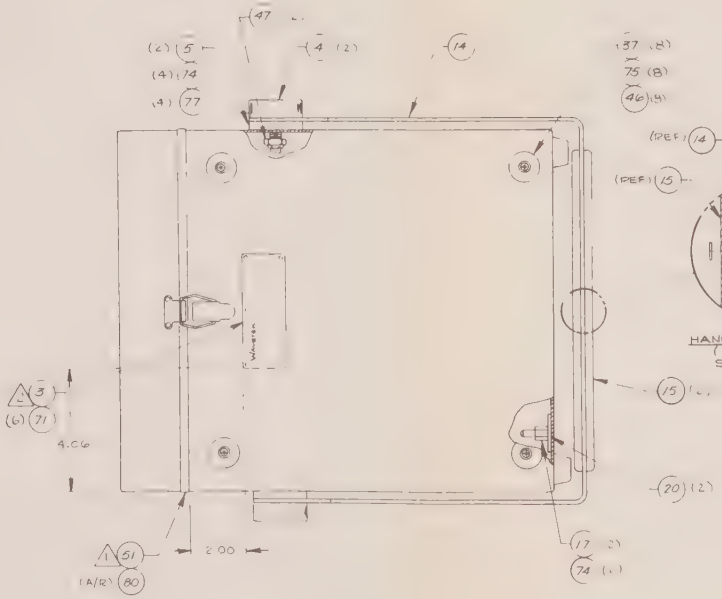


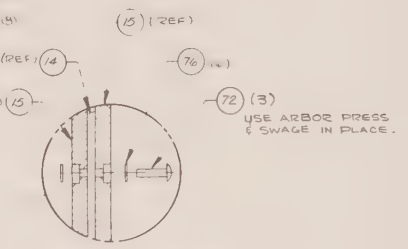




DETAIL 'A'
RIVET INSTALLATION
SCALE: 1/1







USE ARBOR PRESS & SWAGE IN PLACE.

HANDLE INSTALLATION
(3 PLACES)
SCALE: 1/1

4. APPLY DOUBLE SIDED ADHESIVE TAPE (ITEM 79) TO PANEL MTG RAILS IN CASE & INSTALL PANEL FRAME.

3. APPLY DOUBLE SIDED ADHESIVE TAPE (ITEM 79) TO EDGES OF ACCESSORY PANEL (ITEM 16) & INSTALL.

2. METAL STAMP I.D. PLATE WITH MODEL NO., SERIAL NO. & FUSE RATING. MATCH DRILL I.D. PLATE TO CASE USING .096 (#41) DIA HOLE & INSTALL RIVETS (6 PLACES).

1. CLEAN ALL SURFACES OF RUBBER SEAL (ITEM 51) WITH PERCHLOROETHYLENE OR EQUIV. CUT TO PROPER LENGTH BY INSTALLING ON EDGE OF COVER STARTING ON SIDE OPPOSITE COVER CATCH. APPLY THIN EVEN COAT OF ADHESIVE (ITEM 80) IN SEAL GROOVE & INSTALL. LET ADHESIVE CURE FOR 24 HOURS BEFORE CLOSING COVER.

NOTES:

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN B. Freeman	DATE 6/6/75	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY, MULTIMETER
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG		MODEL NO 430
	SCALE 1/2		DWG NO 0102-00-0323 REV A
			CODE IDENT 23338 SHEET 1 OF 4

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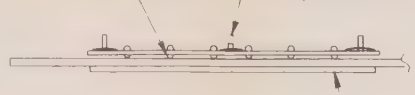
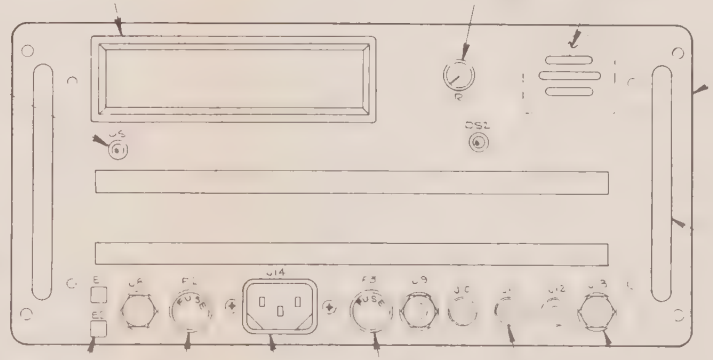
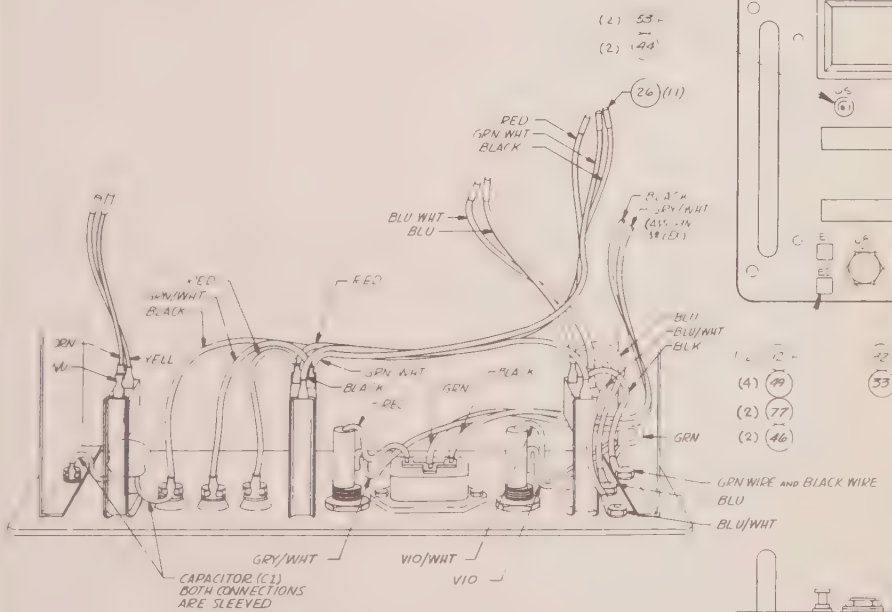
REV	ECN	BY	DATE	APP

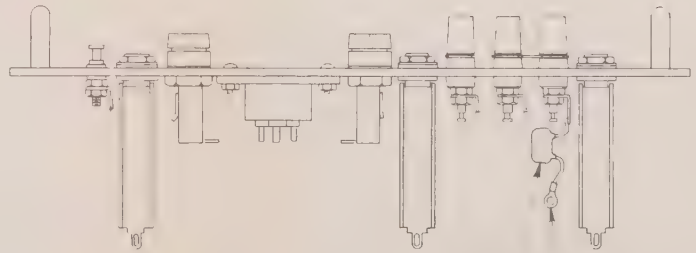


(34) (REF)





WIRING DETAIL
FRONT PANEL
NOTE: WIRES ARE POINT-TO-POINT AS SHOWN (SHRINK SLEEVE AND HARNESS TIES HAVE NOT BEEN SHOWN FOR CLARITY ONLY)



NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN B. REDMAN	DATE 6/14/75	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL #	PROJ. MGR		TITLE ASSEMBLY, FRONT PANEL (MULTIMETER)
	RELEASE APPROV		
FINISH WAVETEK PROCESS #	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG		MODEL NO 430 DWG NO 0102-00-0323 REV A
	SCALE 1/1		CODE IDENT 23338 SHEET 2 OF 4

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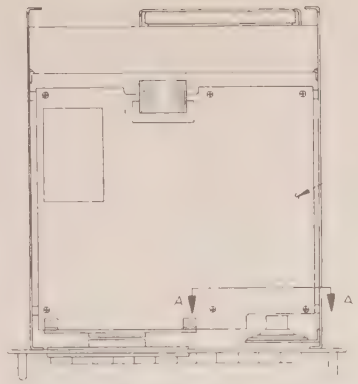
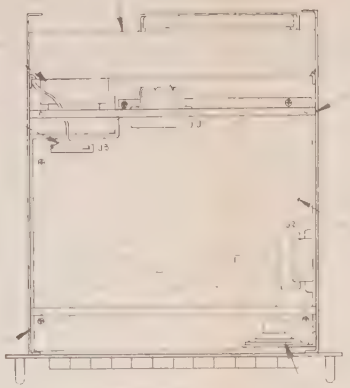
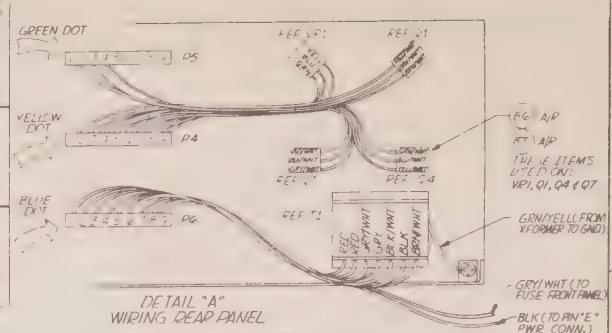
REV	ECN	BY	DATE	APP

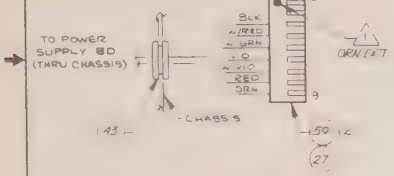




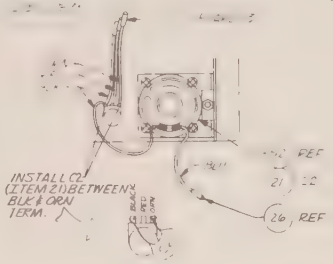
PIN NO.	WIRE COLOR
1	NOT USED
2	BRN/WHT
3	RED/WHT
4	ORN/WHT
5	NOT USED
6	-
7	-
8	-
9	NOT USED
1	BLU WHT
2	WHT/WHT
3	YEL WHT
4	YEL
5	GRN
6	BLU
7	VIO/WHT
8	GRY/WHT
9	BLK/WHT
1	- WHT
2	BLK/WHT
3	RED
4	GRN/WHT
5	RED
6	YEL
7	VIO/WHT
8	BLK



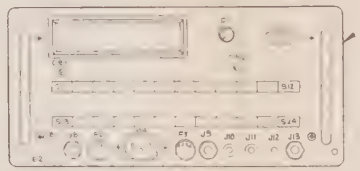
DETAIL "A" WIRING REAR PANEL



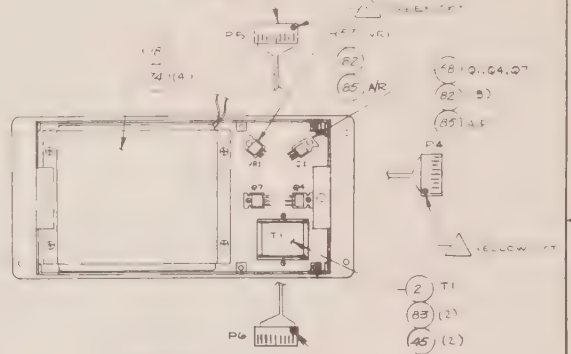
DETAIL A
(SCALE: 1/1)



VIEW A-A
SPEAKER & VOL SW WIRING

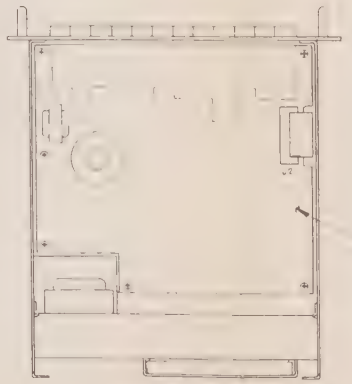


FRONT VIEW

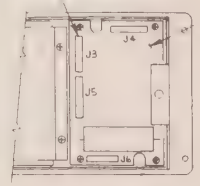


REAR VIEW

△1 BLUE DOT



BOTTOM VIEW



REAR VIEW

△ CODE CONNECTORS P3, P4, P5 & P6 WITH COLORED DOT BOTH SIDES. USE METRON MARKER OR EQUIV.

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN B. REDMAN	DATE 6/8/75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL —	PROJENCA		TITLE CHASSIS ASSEMBLY (MULTIMETER)
	RELEASE APPROV		
FINISH WAVETEK PROCESS —	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		
	DO NOT SCALE DWG		MODEL NO 430
	SCALE 1/2		DWG NO 0102-00-0323 REV A
			CODE IDENT 23338 SHEET 3 OF 4

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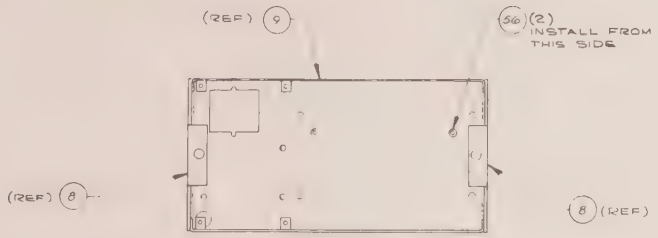
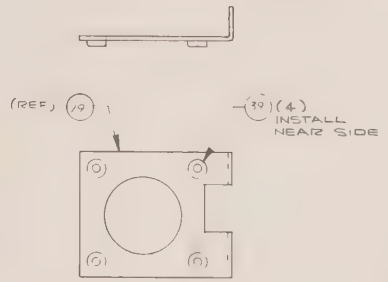
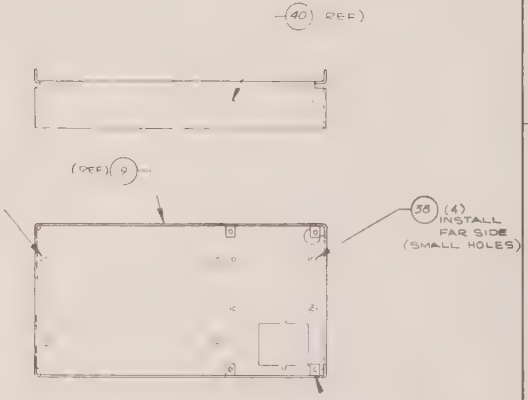
REV	ECN	BY	DATE	APP



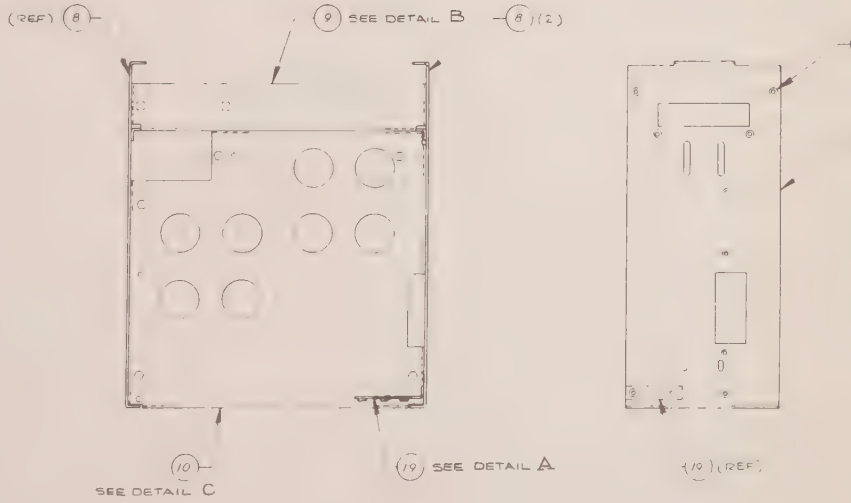


DETAIL A (ITEM 19)

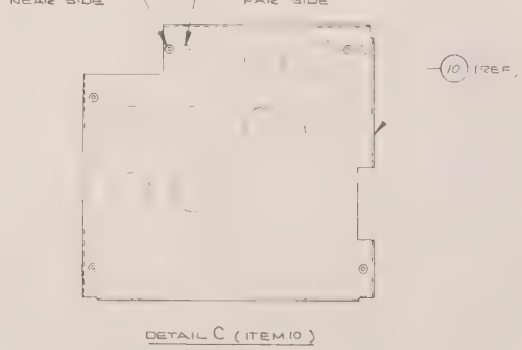


DETAIL B (ITEM 9)

(40) (4) INSTALL WITH THREADED HOLE LOCATED AS SHOWN (4 PLACES) INSTALL ON INSIDE SURFACE OF FLANGE



RIVET ASSY



DETAIL C (ITEM 10)

1. INSTALL INSERTS IN METAL WORK PER DETAILS A, B & C PRIOR TO RIVET ASSY.

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN B. REDMAN	DATE 2/15/75
MATERIAL #	PROJ ENGR	
	RELEASE APPROV	
FINISH WAVETEK PROCESS #	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1 XX ± .030	
	DO NOT SCALE DWG	
	SCALE 1/2	

WAVETEK SAN DIEGO - CALIFORNIA

TITLE: METAL WORK ASSY (MULTIMETER)

MODEL NO	DWG NO	REV
430	0102-00-0323	A

CODE IDENT 23338 SHEET 4 OF 4

THIS DOCUMENT CONTAINS PROPRIETARY INFOR
MATION AND DESIGN RIGHTS BELONGING TO
WAVETEK AND MAY NOT BE REPRODUCED FOR ANY
REASON EXCEPT CALIBRATION OPERATION,
MAINTENANCE WITHOUT WRITTEN AUTHORIZA

REFERENCE DESIGNATIONS	PART DESCRIPTION	[illegible]	[illegible]	WAVETEK NO.	QTY/PT
1	ASSY DWG,CHASSIS	1102-00-00325	[illegible]	0102-00-00325	1
11	[illegible]	SM10-10-0024	[illegible]	1200-00-0014	1
4	[illegible]TEMPLATE	107-434	[illegible]	1400-00-3620	1
2	METAL,NEW	420-404	[illegible]	1400-00-4283	2
5	MASK,MYLAR	420-309	[illegible]	1400-00-4293	2
6	CASE	430-005	[illegible]	1400-00-5170	1
7	[illegible]	430-300	[illegible]	1400-00-5180	1
8	PLATE,SIDE	430-302	[illegible]	1400-00-5193	2
9	PLATE,REAR	430-303	[illegible]	1400-00-5203	1
10	CHASSIS	430-306	[illegible]	1400-00-5213	1
11	PAN	430-305	[illegible]	1400-00-5223	2
12 thru 17	TERMINAL	430-304	[illegible]	1400-00-5233	6
18	FRAME,PANEL	430-307	[illegible]	1400-00-5243	1
19	RAIL	430-308	[illegible]	1400-00-5256	1
20	RAIL,F	430-309	[illegible]	1400-00-5263	2
21	PANEL	430-311	[illegible]	1400-00-5270	1
22	[illegible]	430-312	[illegible]	1400-00-5283	2
23	MART,PAI	430-313	[illegible]	1400-00-5293	1

WAVETEK PARTS LIST | TITLE STD CHASSIS | ASSEMBLY NO 1101-00-00DAW | REV A | PAGE 1

REFERENCE DESIGNATIONS	PART DESCRIPTION	[illegible]	[illegible]	WAVETEK NO.	QTY/PT
35	STANDOFF	1531A-1/4-11	USECO	2R00-02-0001	11
36	[illegible]	[illegible]	MUSTA	2R00-07-0007	2
37	FEET	21971701	MOTAL	2R00-08-0011	4
38	INSERT,R.A	74-11-106-15	SOTCO	2R00-09-0016	4
39	INSERT,R.A	74-11-106-13	SOTCO	2R00-09-0017	4
40	[illegible]	1500-411	USECO	2R00-09-0019	4
41	CLIP,NUT,4-40	8497?-5-62	ESNA	2R00-09-0023	4
42	[illegible]	MG-201	TRASK	2R00-10-0002	2
43	[illegible]	2175	SMITH	2R00-10-0003	1
44	WASH	DEL	UNCOA	2R00-12-0003	8
45	LOCK NUT	[illegible]	SPS	2R00-16-0004	4
46	LOCK NUT	[illegible]	SPS	2R60-16-0005	12
47	NUT	[illegible]	SPS	2R00-16-0006	2
48	[illegible]	2448	SMITH	2R00-27-0004	4
49	WASHER,SHOULDER	2443	SMITH	2R00-27-0005	4
50	PLASTIC STRIP	PLASTIC-MLR-1"	LITH	3000-00-0004	22
51	WINDOW SEAL	305	MUTAL	3000-00-0005	3
L51	SPEAKER	[illegible]455	DATRN	3000-00-0008	1

WAVETEK PARTS LIST | TITLE STD CHASSIS | ASSEMBLY NO 1101-00-00DAW | REV A | PAGE 3

REFERENCE DESIGNATIONS	PART DESCRIPTION	[illegible]	[illegible]	WAVETEK NO.	QTY/PT
19	MART,SPEAKER	430-314	[illegible]	1400-00-5303	1
20	[illegible]	430-321	[illegible]	1400-00-5343	2
C2	CAP,CER,.005MF,500V	[illegible]	[illegible]	1500-05-0210	1
C1	CAP,MICA,.01005F,500V	CM20-912F	[illegible]	1500-19-1201	1
J10 J11 J12	BINDING POST	BF-21-MR	SIMPH	2100-01-0001	3
J5 J14 J4 J5 J6	CONN,SPRING	MM-50-7001	MOLEX	2100-02-0051	5
J14	RECEPT,MICA	EAC-101	SHCFT	2100-03-0005	1
J13 J8 J9	PHONE JACK	52M	NACFE	2100-03-0021	3
24	TERM,LOCK LUG	1013-6	SMITH	2100-04-0000	6
26	CLIP	[illegible]	AMP	2100-05-0017	1
27	PIN	MM-50-HC104	MOLEX	2100-05-0025	16
28	PIN,SMALL	[illegible]	MIGAN	2400-01-0010	1
29	FUSE CLIP	121001	LITFU	2400-05-0005	6
[illegible]	FUSE,250V,1A	312001	LITFU	2400-05-0007	1
[illegible]	FUSE,125V,1/2A,SB	313.250	LITFU	2400-05-0008	2
[illegible]	FUSE,125V,1/4A,SB	313.500	LITFU	2400-05-0010	2
[illegible]	FUSE HOLD	345001	LITFU	24[illegible]0015	2
[illegible]	DISPLAY BEZEL	920-15	ADMEX	2R00-08-0001	1

WAVETEK PARTS LIST | TITLE STD CHASSIS | ASSEMBLY NO 1101-00-00DAW | REV A | PAGE 2

REFERENCE [illegible]	PART DESCRIPTION	[illegible]	[illegible]	WAVETEK NO.	QTY/PT
-	[illegible] MOD. INST. MANUAL	430-322	[illegible]	4A00-05-0207	1
[illegible]	LEAD	[illegible]	[illegible]	4A99-00-0004	2
[illegible]	TWIST	[illegible]	[illegible]	4902-00-0300	3
[illegible]	PANEL ASSY	[illegible]	[illegible]	1A01-30-0004	1
[illegible]	PWR CORD	8-77AR-00A-LX	PACMD	1A01-80-0005	1
[illegible]	VOLTAGE REGULATOR	7805SWK	FAIR	1A00-7A-0500	1

WAVETEK PARTS LIST | TITLE STD CHASSIS | ASSEMBLY NO 1101-00-00DAW | REV A | PAGE 4

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE: PARTS LIST STD CHASSIS
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 ANGLES 1 XX .030		
	DO NOT SCALE DWG		MODEL NO. 430 / WCN 1101 00 0064 / REV A
	SCALE		CODE IDENT 23338 / SHEET OF

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY PT
56	RIVET, 1/8 DIA	5 X 523	DAYTON		
71	RIVET, 3/32 DIA (1/8 GRIP)	AD32-ABS	USM		
72	RIVET, OVAL HEAD TUBULAR 1/8 DIA X 1/2 LONG ALUM	MS16535-164			
[illegible]	RIVET, 1/8 DIA (LARGE FLANGE)	4 X 579	DAYTON		
[illegible]	SCREW, LOCKING 6-32 X 5/16	LP2262P5	LG-LOK		
[illegible]	SCREW, 6-32 X 1/2	COML			
[illegible]	WASHER, FLAT NO. 4	COML			
[illegible]	WASHER, FLAT NO. 6	COML			
[illegible]	WASHER, FLAT (NYLON) NO. 6	2515	SMITH		
[illegible]	TAPE, FOAM, DOUBLE FACE ADHESIVE, 3/8 IN. WIDE	COML			
80	ADHESIVE	847	[illegible]		
81	SCREW, LOCKING 6-32 X 1/2	LP22D62P8	[illegible]		
82	SCREW, NO. 4-40 X 3/8 PH	[illegible]			

WAVETEK PARTS LIST | TITLE: STD CHASSIS | ASSEMBLY NO: 1101-00-0064 | REV:

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY PT
83	SCREW, NO. 4-40 X 1-1/4 PH	COML			
84	WASHER, SPRING LOCK NO. 6	COML			
85	THERMAL COMPOUND	120-2	[illegible]		
86	TUBING, HEAT SHRINK 1/16 DIA	FIT-221-1/16	[illegible]		
87	LACING CORD (BLACK)	LC-132	[illegible]		
88	SPEAKER CLOTH (1-1/2 X 1-1/2)	A-4021(BLK)	[illegible]		
89	SCREW, NO. 4-40 X 1/2 LONG PH	COML			
[illegible]	SCREW 82°, F.H., NO. 10-32X1/2 LONG	[illegible]			

WAVETEK PARTS LIST | TITLE: STD CHASSIS | ASSEMBLY NO: 1101-00-0064 | REV:
PAGE: 6

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES | DRAWN | DATE
MATERIAL | PROJENGR
RELEASE APPROV
FINISH: WAVETEK PROCESS
TOLERANCE UNLESS OTHERWISE SPECIFIED: XXX ±.010 ANGLES ±1, XX ±.030
DO NOT SCALE DWG
SCALE

WAVETEK SAN DIEGO, CALIFORNIA
TITLE: PARTS LIST STD CHASSIS
MODEL NO: 430 | DWG NO: 1101-00-0064 | REV: A
CODE IDENT: 23338 | SHEET | OF

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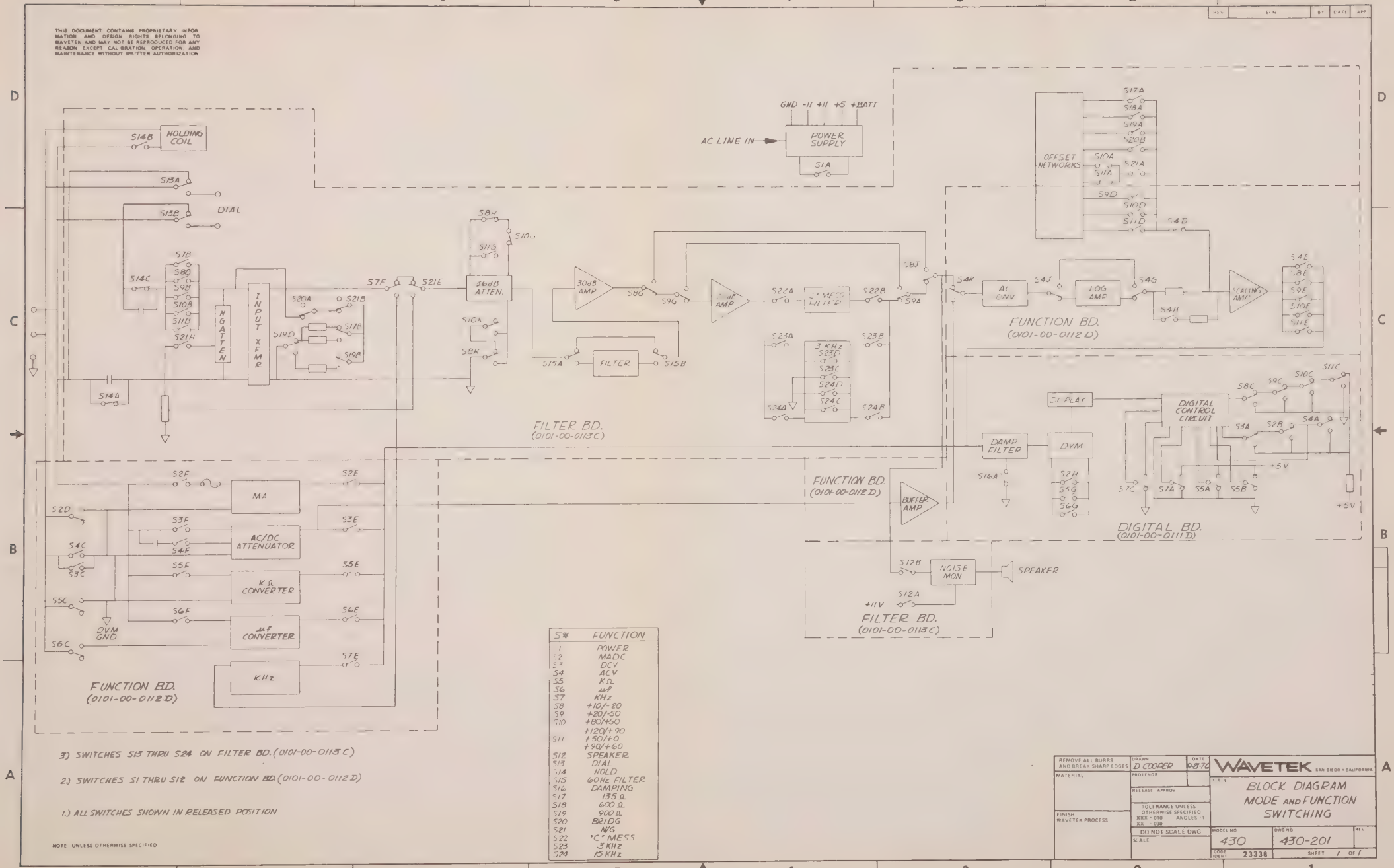


S#	FUNCTION
1	POWER
S2	MADC
S3	DCV
S4	ACV
S5	KΩ
S6	μf
S7	KHz
S8	+10/-20
S9	+20/-50
S10	+80/+50 +120/+90
S11	+50/+0 +90/+60
S12	SPEAKER
S13	DIAL
S14	HOLD
S15	60HZ FILTER
S16	DAMPING
S17	135 Ω
S18	600 Ω
S19	900 Ω
S20	BRIDG
S21	N/G
S22	"C" MESS
S23	3 KHz
S24	15 KHz

3) SWITCHES S13 THRU S24 ON FILTER BD. (0101-00-0113C)

2) SWITCHES S1 THRU S12 ON FUNCTION BD. (0101-00-0112D)

1) ALL SWITCHES SHOWN IN RELEASED POSITION

NOTE UNLESS OTHERWISE SPECIFIED

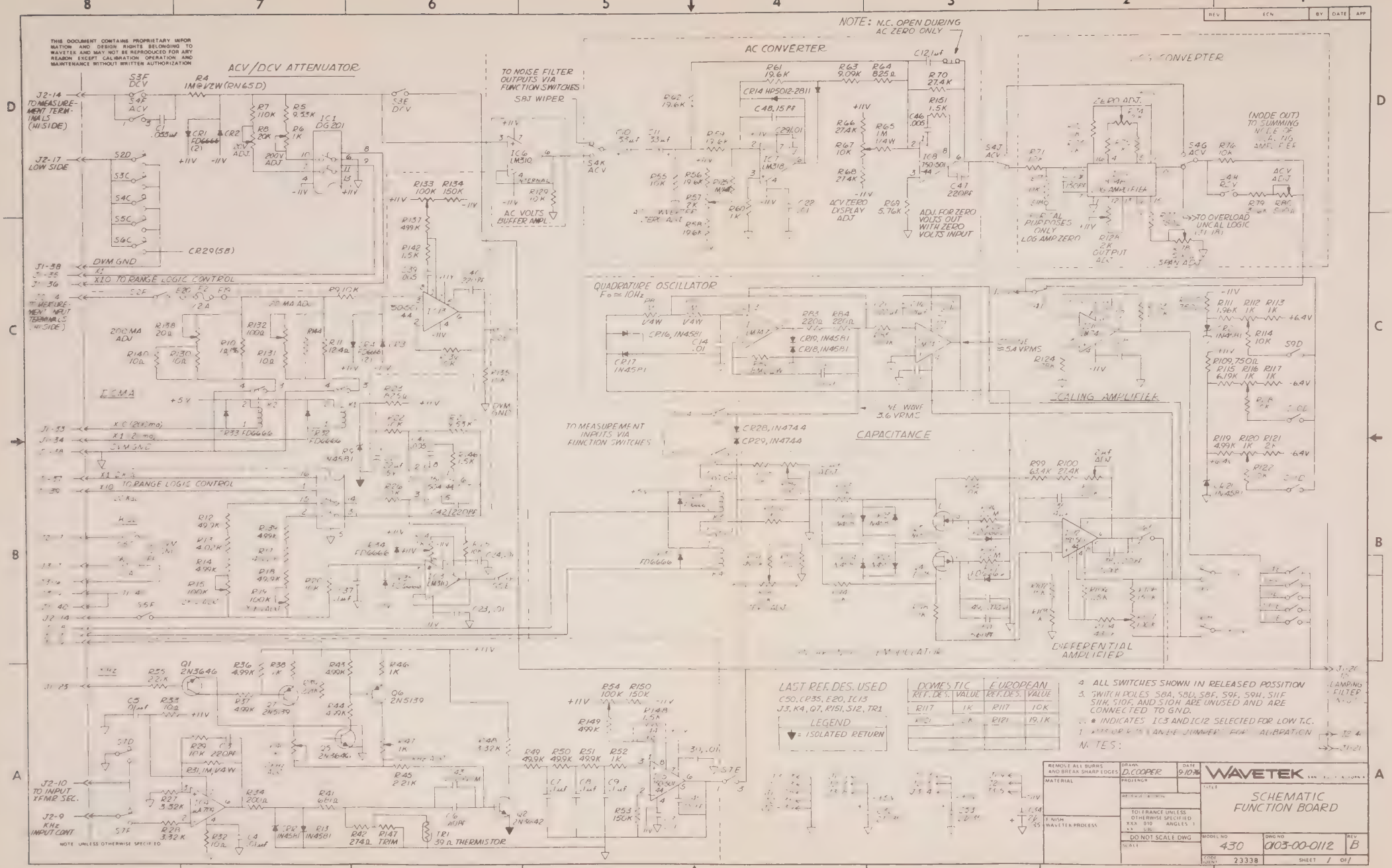
REV	I-N	BY	DATE	APP

REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN D COOPER DATE 08-70
PROJ'NGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030
DO NOT SCALE DWG
SCALE

WAVETEK SAN DIEGO, CALIFORNIA

TITLE: BLOCK DIAGRAM MODE AND FUNCTION SWITCHING

MODEL NO 430 | DWG NO 430-201 | REV
CODE IDENT 23338 | SHEET 1 OF 1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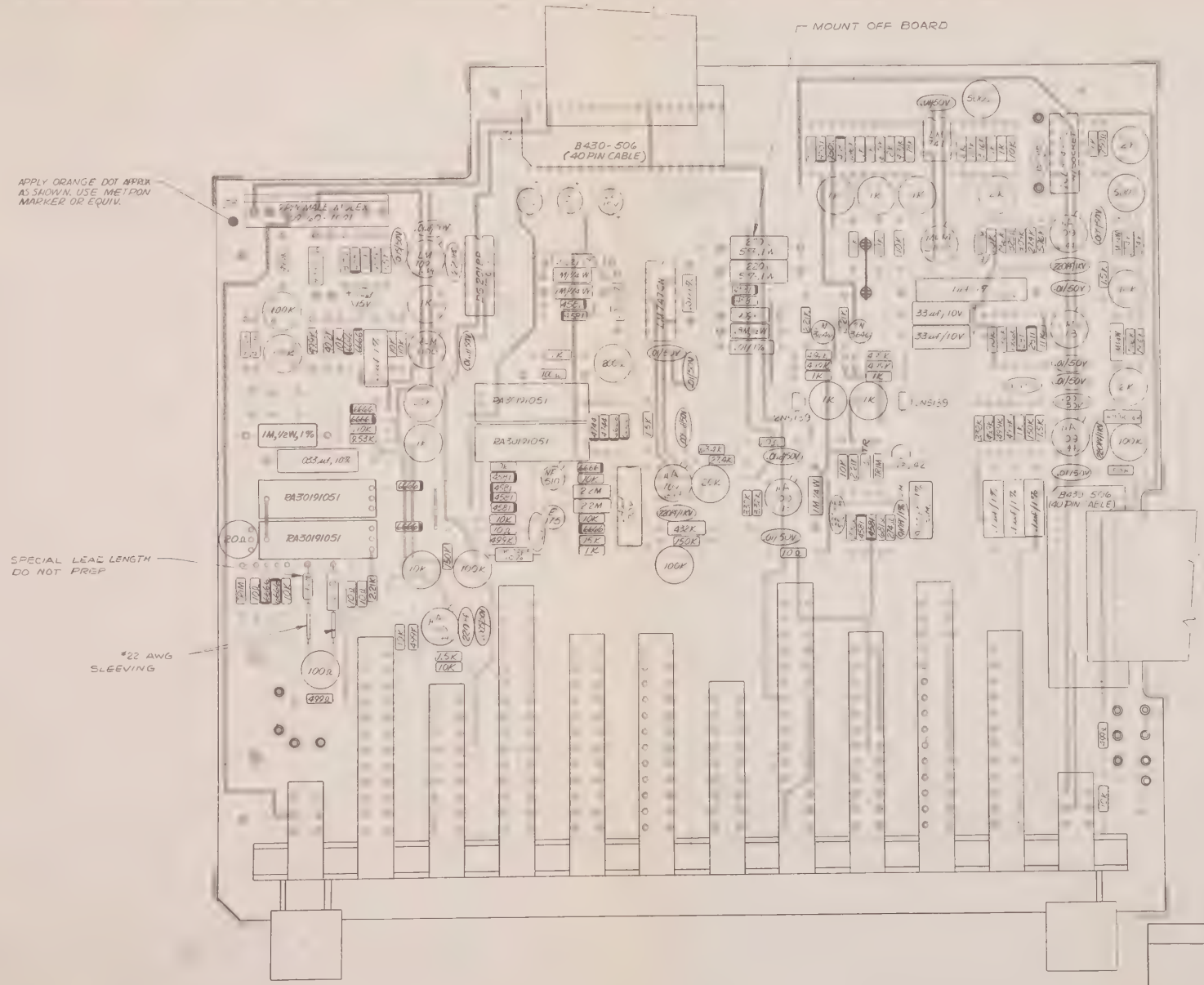
ACV/DCV ATTENUATOR
AC CONVERTER
NOTE: N.C. OPEN DURING AC ZERO ONLY
TO NOISE FILTER OUTPUTS VIA FUNCTION SWITCHES
S4J WIPER
S4K ACV
ADJ FOR ZERO VOLTS OUT WITH ZERO VOLTS INPUT
ACV ZERO DISPLAY ADJ
DC CONVERTER
ZERO ADJ.
(NODE OUT) TO SUMMING NODE OF A/D AMPLIFIER
TO OVERLOAD UNCAL LOGIC
GENERAL PURPOSES ONLY LOG AMP ZERO
QUADRATURE OSCILLATOR
Fo ≃ 10Hz
SCALING AMPLIFIER
CAPACITANCE
TO MEASUREMENT INPUTS VIA FUNCTION SWITCHES
DIFFERENTIAL AMPLIFIER
LAMPING FILTER
DVM GND
X10 TO RANGE LOGIC CONTROL
X1 TO RANGE LOGIC CONTROL
J2-14 TO MEASUREMENT TERMINALS (INSIDE)
J2-17 LOW SIDE
J2-10 TO INPUT XFMR SEC.
J2-9 KHz INPUT CONT
TRI 39Ω THERMISTOR
LAST REF. DES. USED
C50, CR35, E20, IC13 J3, K4, Q7, R151, S12, TR1
LEGEND
▼ = ISOLATED RETURN
DOMESTIC
EUROPEAN
R117 1K
R121 19.1K
R117 10K
4. ALL SWITCHES SHOWN IN RELEASED POSSITION
3. SWITCH POLES S8A, S8D, S8F, S9F, S9H, S11F S11H, S10F, AND S10H ARE UNUSED AND ARE CONNECTED TO GND.
.. * INDICATES IC3 AND IC12 SELECTED FOR LOW T.C.
1. MTG. OF W1 ANGLE JUMPER FOR ALIGNMENT
NOTES:
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN D. COOPER
DATE 9-10-76
PROJENGR
TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 XX .030 ANGLES 1°
DO NOT SCALE DWG
SCALE
WAVETEK
TITLE
SCHEMATIC FUNCTION BOARD
MODEL NO 430
DWG NO 0103-00-0112
REV B
TODD NUMBER 23338
SHEET 1 OF 1



ALL ¼W ±1% METAL FILM RESISTORS ± .5
EXCEPT AS NOTED

	D COOPER	8 10 76	WAVETEK
			ASSEMBLY FUNCTION BOARD (A2) (MULTIMETER)
		430	0101-00-0112 D
			SHT 1 OF 1

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DRWG,FUNCTION	0101-00-01120	WVTK	0101-00-01120	1
NONE	SCHEMATIC,FUNCTION	0103-00-01120	WVTK	0103-00-01120	1
C22 C23 C24 C25 C26 C27 C28 C29 C30 C31 C4 C5	CAP,CER,.01MF,50V	CK-103	CHI...	1500-01-0310	12
C48	CAP,CER,150PF,1KV	DD-150	CHI...	1500-01-5011	1
C3 C3A C40 C42 C45	CAP,CER,220PF,1KV	DD-221	CHI...	1500-02-2111	5
C17 C39 C41 C44 C46	CAP,CER,.005MF,50V	CK-502	CHI...	1500-05-0210	5
C13	CAP,MICA,150PF,500V	DM15-151J	ARCO	1500-11-5100	1
C47	CAP,MICA,220PF,500V	DM15-221J	ARCO	1500-12-2100	1
C50	CAP,MICA,560PF,500V	DM15-561J	ARCO	1500-15-6100	1
C6	CAP,MICA,910PF,500V	DM15-911J	ARCO	1500-19-1101	1
C43	CAP,MICA,.0100PF,500V	DM20-812F	ARCO	1500-19-1201	1
C14 C15 C16	CAP,POLYC,..01MF,100V	PA2D103F	TRW	1500-81-0300	3
C37 C7 C9 C9	CAP,POLYC,.1MF,100V	PA2D106F	TRW	1500-81-0400	4
C42	CAP,POLYC,.1MF,100V	2100-PIC-1A5F	TRW	1500-81-0500	1
C49	POLYC,..0022MF,200V	192P22292	SPRAG	1500-82-2200	1
C21	POLYE,..022MF,200V	192P22392	SPRAG	1500-82-2300	1
C1	CAP,MYLR,.033MF,1KV	7D1A333K	ELPAC	1500-83-3307	1

WAVETEK PARTS LIST | TITLE FUNCTION | ASSEMBLY NO 1100-00-0112 | REV | PAGE: 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R7A R8A	POT,TRIM,500	91A8500	RFCH	4600-05-0108	2
R86	RES,C,1/2W,5%,1.8K	RC20GF-185	STKPL	4700-25-1800	1
R9A R97	RES,C,1/2W,10%,2.2M	RC20GF-225	STKPL	4700-25-2204	2
R83 R96	RES,C,1M,5%,220	RC32GF-221	STKPL	4700-35-2200	2
R12A	RES,MF,1/8W,1%,100	MK550-10000F	TRW	4701-03-1000	1
R101 R113 R117 R1A R6A R52 R71 R75 R8A	RES,MF,1/8W,1%,1K	MK550-10001F	TRW	4701-03-1001	9
R110 R11A R122 R129 R13% R13A R185 R20 R22 R25 R2A R29 R55 R71 R7A R9 R93 R9A 305 R9A	RES,MF,1/8W,1%,10K	MK550-10002F	TRW	4701-03-1002	20
R13A R131 R14A R17 R33 R92	RES,MF,1/8W,1%,10	MK550-10R0F	TRW	4701-03-1009	6
R60 R72	RES,MF,1/8W,1%,11K	MK550-11002F	TRW	4701-03-1102	2
R7	RES,MF,1/8W,1%,110R	MK550-11R0F	TRW	4701-03-1103	1
R11	RES,MF,1/8W,1%,12.4	MK550-12R4F	TRW	4701-03-1249	1
R14A R142 R146 R18A R 53	RES,MF,1/8W,1%,1.5K	MK550-15001F	TRW	4701-03-1501	5
R102	RES,MF,1/8W,1%,15K	MK550-15002F	TRW	4701-03-1502	1
R10A R13A R150 R53	RES,MF,1/8W,1%,150R	MK550-15R0F	TRW	4701-03-1509	4

WAVETEK PARTS LIST | TITLE FUNCTION | ASSEMBLY NO 1100-00-0112 | REV | PAGE: 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C35	CAP,MYLR,.1MF,100V	MA31W0QF	IMH	1500-66-0A0A	1
C2 C32 C33 C34	CAP,TANT,22MF,15V	196D226X9015KA1	SPRAG	1500-72-2A01	4
C10 C11	CAP,TANT,33MF,10V	150D336X9010A2	SPRAG	1500-73-3A01	2
NONE	FUNCTION	430-511	WVTK	1700-00-0112	1
NONE	CONN,PIN	09-50-1000	MOLEX	2100-02-0052	1
NONE	SKT,IC,16PIN	1A-16DIP	CIRCH	2100-03-0022	2
NONE	TERM	2000R1	USECO	2100-05-0009	2
NONE	PIN,WAIT	A11A2-2	AMP	2100-05-0020	13
K1 K2 K3 K4	RELAY,REED,FORM-A	MA3A019-1051	ELNA	4500-00-0007	4
M132	POT,TRIM,100	91A8100	RFCH	4600-01-0101	1
R112 R11A R120 R24 R40 R47 R4	POT,TRIM,1K	91A81K	RFCH	4600-01-0209	7
R67 R90	POT,TRIM,10K	91A810K	RFCH	4600-01-0315	2
R107 M133 M15 R19 R5A	POT,TRIM,100K	91A8100K	RFCH	4600-01-0802	5
M13A	POT,TRIM,20	91A820	RFCH	4600-02-0000	1
R80	POT,TRIM,200	91A8200	RFCH	4600-02-0101	1
R12A R57 R7A	POT,TRIM,2K	91A82K	RFCH	4600-02-0201	3
M101 R8	POT,TRIM,20K	91A820K	RFCH	4600-02-0301	2

WAVETEK PARTS LIST | TITLE FUNCTION | ASSEMBLY NO 1100-00-0112 | REV | PAGE: 2

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R12A	RES,MF,1/8W,1%,1.78K	MK550-17801F	TRW	4701-03-1781	1
R111	RES,MF,1/8W,1%,1.96K	MK550-19601F	TRW	4701-03-1961	1
M6A R5A R59 R61 R62	RES,MF,1/8W,1%,19.6K	MK550-19602F	TRW	4701-03-1962	5
R54	RES,MF,1/8W,1%,200	MK550-20R0F	TRW	4701-03-2000	1
R121 R123	RES,MF,1/8W,1%,2K	MK550-20001F	TRW	4701-03-2001	2
M1 R35 M39 R45	RES,MF,1/8W,1%,2.21K	MK550-22101F	TRW	4701-03-2211	4
R62	RES,MF,1/8W,1%,274	MK550-27402F	TRW	4701-03-2740	1
M100 M6A R4A R70	RES,MF,1/8W,1%,27.4K	MK550-27402F	TRW	4701-03-2742	8
R79	RES,MF,1/8W,1%,3.16K	MK550-31A1F	TRW	4701-03-3161	1
R27 R2A R4A	RES,MF,1/8W,1%,3.32K	MK550-33201F	TRW	4701-03-3321	3
R13	RES,MF,1/8W,1%,8.06K	MK550-40601F	TRW	4701-03-4021	1
R17	RES,MF,1/8W,1%,80.2K	MK550-80202F	TRW	4701-03-4022	1
M2	RES,MF,1/8,1%,499	MK550-4990 F	TRW	4701-03-4990	1
R119 R1A M36 R37 R85 R44	RES,MF,1/8W,1%,4.99K	MK550-49901F	TRW	4701-03-4991	6
R12 M1A M40 R50 M51 M91	RES,MF,1/8W,1%,49.9K	MK550-49902F	TRW	4701-03-4992	6
M69	RES,MF,1/8W,1%,5.76K	MK550-57601F	TRW	4701-03-5761	1
M115	RES,MF,1/8W,1%,6.19K	MK550-61901F	TRW	4701-03-6191	1

WAVETEK PARTS LIST | TITLE FUNCTION | ASSEMBLY NO 1100-00-0112 | REV | PAGE: 4

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	ENG/ENGR		TITLE: PARTS LIST FUNCTION BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 ANGLES ±1 XX .030		
	DO NOT SCALE DWG		MODEL NO 430 / DWG NO 1100-00-0112 / REV
	SCALE		CODE IDENT 23338 / SHEET 1 OF 2

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R99	RES,MF,1/8W,1%,63.4K	RN55D-6342F	TRW	4701-03-6342	1
R81	RES,MF,1/8W,1%,681	RN55D-6810F	TRW	4701-03-6810	1
R104 R110 R77	RES,MF,1/8W,1%,750	RN55D-7500F	TRW	4701-03-7500	3
R24 R80	RES,MF,1/8W,1%,825	RN55D-8250F	TRW	4701-03-8250	2
R83	RES,MF,1/8W,1%,9.09K	RN55D-9091F	TRW	4701-03-9091	1
R21 R5	RES,MF,1/8W,1%,9.53K	RN55D-9531F	TRW	4701-03-9531	2
R125 R31 R65 R81 R82	RES,MF,1/8W,1%,1M	RN60D-1004F	TRW	4701-13-1004	5
R108	RES,MF,1/8W,1%,432K	RN60D-4323F	TRW	4701-13-4323	1
R137 R139 R149	RES,MF,1/8W,1%,499K	RN60D-4993F	TRW	4701-13-4993	3
R8	RES,MF,1/2W,1%,1M	RN65D-1004F	TRW	4701-23-1004	1
R84	RES,MF,1/2W,1%,909K	RN65D-9093F	TRW	4701-23-9093	1
R10	RES,WW,1/8W,.1%,1	RW70L1R00F	CAL-R	4702-12-0109	1
CR12 CR13 CR16 CR17 CR18 CR19 CR20 CR21 CR22 CR23 CR24 CR25 CR9	DIODE	1N4581	MICRO	4801-01-4581	13
CR28 CR29	DIODE	1N4744	NAT	4801-01-4744	2
CR1 CR2 CR26 CR27 CR4 CR30 CR31 CR32 CR33 CR34 CR35 CR6	DIODE	SD-4446	FAIR	4807-02-6666	12

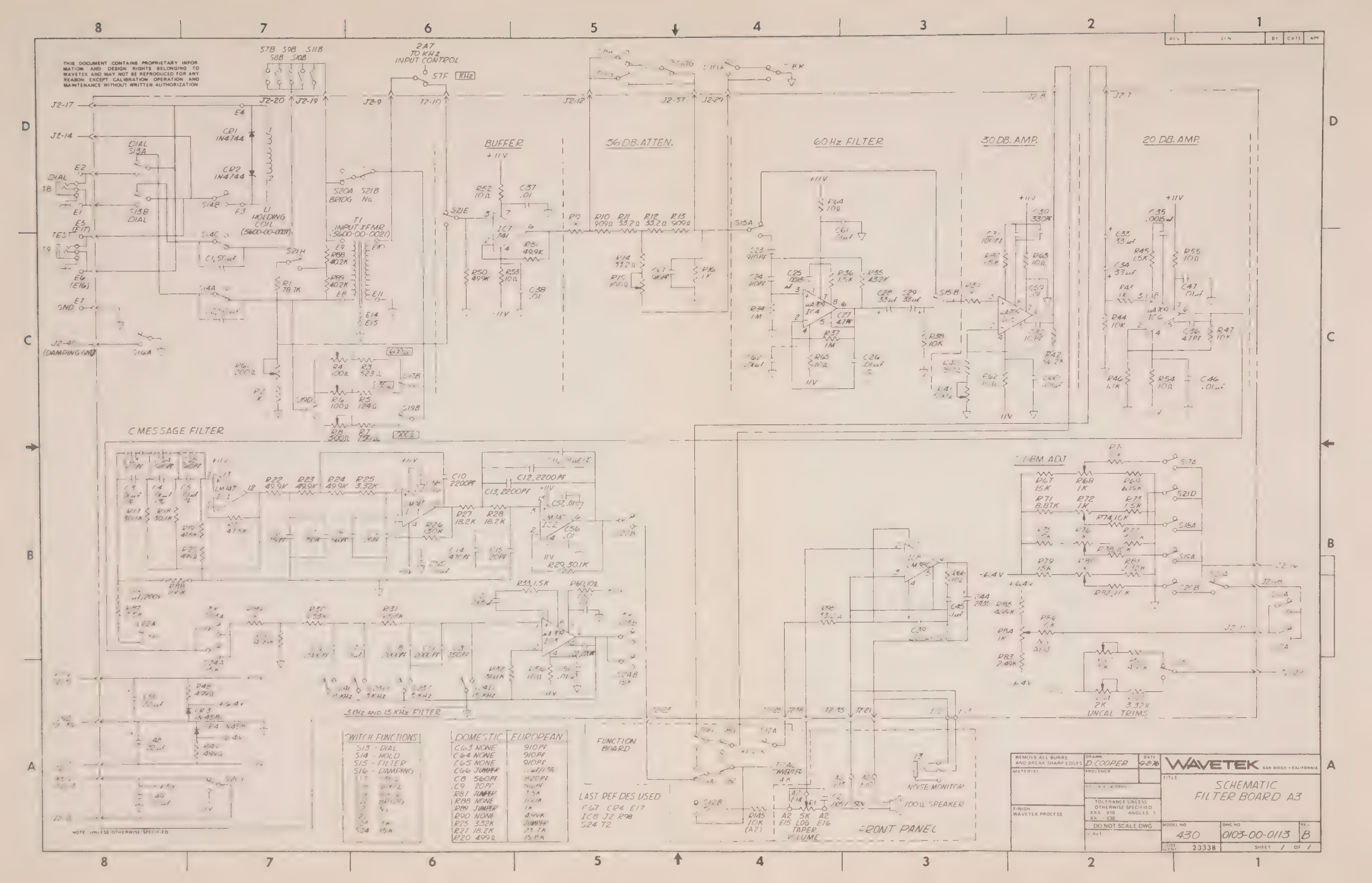
WAVETEK PARTS LIST	TITLE FUNCTION	ASSEMBLY NO 1100-00-0112 PAGE: 5	REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
CR10 CR15	DIODE	5082-2811	HP	4809-02-2811	2
Q2	TRANS	2N4402	FAIR	4901-03-4402	1
Q1 Q5	TRANS	2N5401	FAIR	4901-03-4401	2
Q4 Q7	TRANS	2N5139	FAIR	4901-05-1390	2
Q6	TRANS	E175	SILX	4902-00-1750	1
Q3	TRANS	MF-410	NSC	4902-00-5100	1
MONF	SWITCH ASSY PB	430-501	MVTK	5103-00-0022	1
TR1	THERMISTER	TG1/R-39	TI	5300-00-0001	1
MONF	CAMLF ASSY	430-504	MVTK	6002-00-0001	2
IC3 IC6	IC	SG-3101	SILSN	7000-03-1000	2
IC7	IC	LM318H	NSC	7000-03-1800	1
IC10	IC	MA-701	FAIR	7000-07-0100	1
IC11	IC	L4747CN	NSC	7000-07-4700	1
IC8	IC,CLASS I,MA-709 QTY:1:1170-07-0904	130-501-13	MVTK	7200-00-0005	1
IC12 IC13 IC2 IC5 IC6	IC,CL 1 SPEC,MA-709 QTY:1:1170-07-0904	750-501-04	MVTK	7200-00-0007	5
IC1	IC	0026IAP	SILX	8000-02-0100	1
IC9	IC	ICL8048CCPE	INTSL	8000-A0-4800	1

WAVETEK PARTS LIST	TITLE FUNCTION	ASSEMBLY NO. 1100-00-0112 PAGE: 6	REV

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE: PARTS LIST FUNCTION BD.
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1 XX ± .030		MODEL NO 430 / DWG NO 1100-00-0112 / REV
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET 2 OF 2
	SCALE		

NOTE UNLESS OTHERWISE SPECIFIED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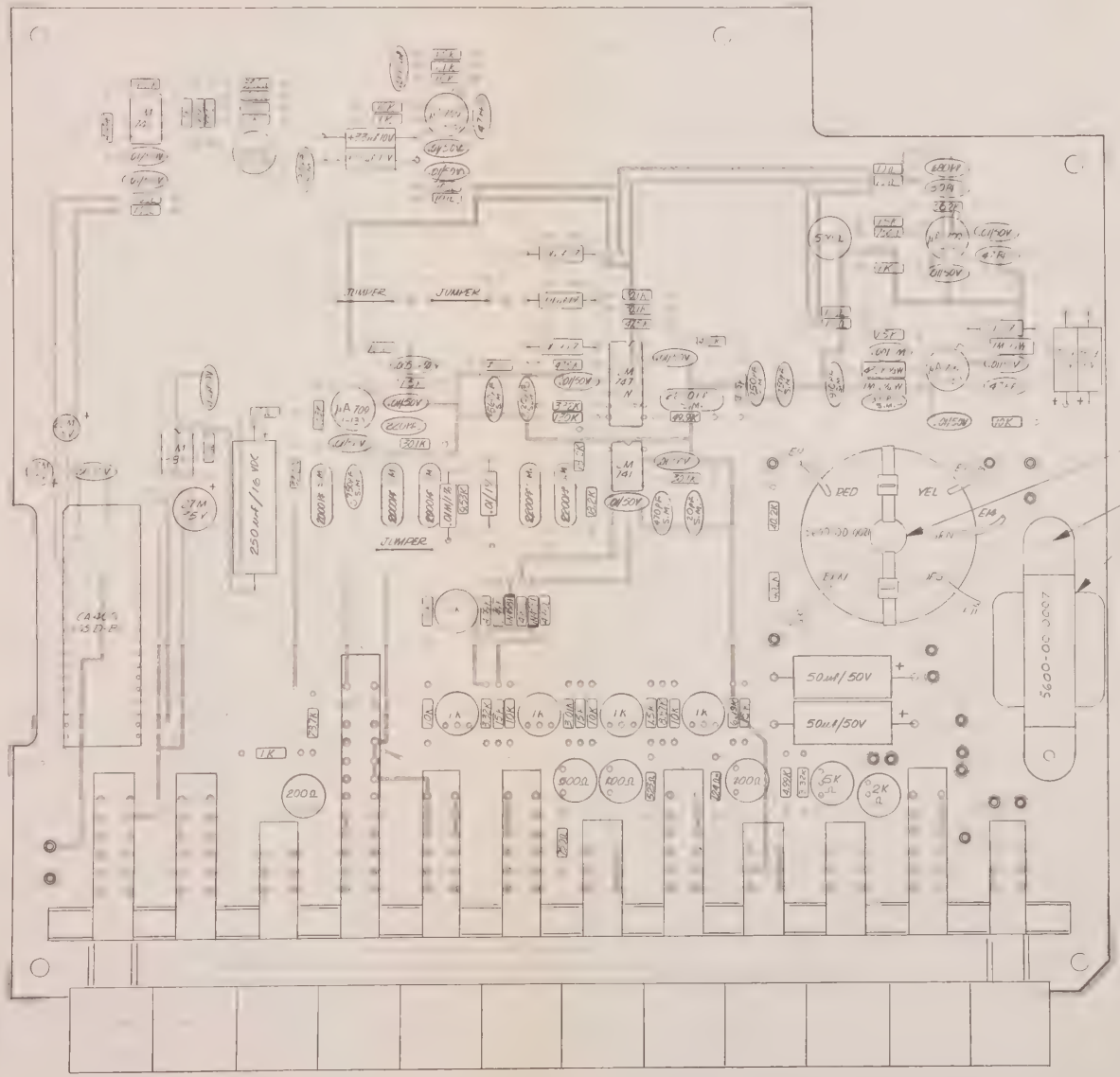
BUFFER
36 DB. ATTEN.
60 Hz FILTER
30 DB. AMP.
20 DB. AMP.
C MESSAGE FILTER
3 kHz AND 15 kHz FILTER
VBM ADJ
2K
3.32K
UNCAL TRIMS
SWITCH FUNCTIONS
S13 - DIAL
S14 - HOLD
S15 - FILTER
S16 - DAMPING
DOMESTIC
EUROPEAN
FUNCTION BOARD
LAST REF DES USED
IC8 J2 R98
S24 T2
NOISE MONITOR
100Ω SPEAKER
FRONT PANEL
TAPER VOLUME
NOTE UNLESS OTHERWISE SPECIFIED
REMOVE ALL BURRS AND BREAK SHARP EDGES
DRAWN D. COOPER
DATE 9-8-76
PROJECTOR
TOLERANCE UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DWG
FINISH WAVETEK PROCESS
WAVETEK SAN DIEGO, CALIFORNIA
TITLE
SCHEMATIC
FILTER BOARD A3
MODEL NO 430
DWG NO 0103-00-0113
REV B
SIZE A
CAGE NO 23338
SHEET 1 OF 1



E. E. MEAN MAKE NECESSARY
COMPONENT VALUES AS SHOWN

(DOMESTIC) [illegible] FILTER		(EUROPEAN) PSOPHOMETRIC FILTER	
REF DES	VALUE	REF DES	VALUE
[illegible]	[illegible]	[illegible]	3100PF
[illegible]	" "	[illegible]	2100PF
C5	4700 PF	C5	6100PF
[illegible]	JUMPER	[illegible]	.1uF 1%
[illegible]	[illegible]	[illegible]	20115.5%
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	JUMPER	C24	1.5K
[illegible]	[illegible]	R26	100K
R27	JUMPER	R27	1K
[illegible]	[illegible]	R28	4.42K
R25	3.32K	R25	JUMPER
R27	1.37K	R27	23.7K
R28	4.42K	R28	15.4K

NOTE TO ASSEMBLER
PREP. RES AT .5

	D. COOPER	8 DEC	WAVETEK
	[illegible]	8 11 [illegible]	ASSEMBLY FILTER BOARD (A3) (MULTIPLIER) DOMESTIC VERSION
			430 | 0101-00-0113 | C
			SHT 1 OF 1

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DRWG,FILTER	0101-00-0113C	WVTK	0101-00-0113C	1
NONE	SCHEMATIC,FILTER	0103-00-0113B	WVTK	0103-00-0113B	1
C51	CAP,CER,100PF,1KV	[illegible]	CRL	1500-01-0111	1
C52 C55 C56 C57 C58 C59 C60 C61 C62	CAP,CER,.01MF,50V	[illegible]	CRL	1500-01-0310	15
C65	CAP,CER,.1MF,10V	[illegible]	AMCO	1500-01-0412	1
C25 C35	CAP,CER,.0015PF,1KV	DD-152 LONG LEAD	CRL	1500-01-5201	2
C22	CAP,CER,220PF,1KV	[illegible]	CRL	1500-02-2111	1
C30	CAP,CER,.330PF,1KV	[illegible]	CRL	1500-03-3111	1
C27 C36	CAP,CER,.47PF,1KV	[illegible]	CRL	1500-04-7011	2
C21	CAP,CER,.005MF,50V	[illegible]	CRL	1500-05-0210	1
C15 C9	CAP,MICA,20PF,500V	[illegible]	AMCO	1500-12-0000	2
C14 C18 C19	CAP,MICA,2000PF,500V	[illegible]	AMCO	1500-12-0200	3
C10 C12 C13	CAP,MICA,2200PF,500V	[illegible]	AMCO	1500-12-2200	3
C38	CAP,MICA,470PF,500V	[illegible]	AMC	1500-14-7100	1
C8	CAP,MICA,560PF,500V	[illegible]	AMCO	1500-15-6100	1
C20 C4 C7	CAP,MICA,750PF,500V	[illegible]	AMCO	1500-17-5100	3
C23 C24 C67	CAP,MICA,910PF,500V	[illegible]	AMCO	1500-19-1100	3

WAVETEK PARTS LIST | TITLE FILTER | ASSEMBLY NO 1100-00-0113 | PAGE 1 | REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
W2	POT,TRIM,5K	[illegible]	BECK	4600-05-0205	1
R1A R2 R39 R43 R9	RES,MF,1/8W,1%,1K	RN55D-1001F	TRW	4701-03-1001	5
R5A W4A R47 R70 R7A W2A R86	RES,MF,1/8W,1%,10K	RN55D-1002F	TRW	4701-03-1002	8
W52 R53 R54 R55 R56 R61 R62 R63 R64 R65 W4A	RES,MF,1/8W,1%,10	RN55D-10R0F	TRW	4701-03-1009	11
R4A	RES,MF,1/8W,1%,1.1K	RN55D-1101F	TRW	4701-03-1101	1
W5	RES,MF,1/8W,1%,124	RN55D-1240F	TRW	4701-03-1240	1
W2A	RES,MF,1/8W,1%,130K	RN55D-1303F	TRW	4701-03-1303	1
R33 R36 R45 R73 R87	RES,MF,1/8W,1%,1.5K	RN55D-1501F	TRW	4701-03-1501	5
R47 R75 W7A	RES,MF,1/8W,1%,15K	RN55D-1502F	TRW	4701-03-1502	3
W2T W2A	RES,MF,1/8W,1%,18.2K	RN55D-1822F	TRW	4701-03-1822	2
R83	RES,MF,1/8W,1%,2.49K	RN55D-2491F	TRW	4701-03-2491	1
R77	RES,MF,1/8W,1%,3.01K	RN55D-3011F	TRW	4701-03-3011	1
W17 W1A R29 R42	RES,MF,1/8W,1%,30.1K	RN55D-3012F	TRW	4701-03-3012	4
W2A W21 R93	RES,MF,1/8W,1%,3.32K	RN55D-3321F	TRW	4701-03-3321	3
R11 R12 R19 R95	RES,MF,1/8W,1%,33.2	RN55D-33R2F	TRW	4701-03-33R2	4
W4A W49	RES,MF,1/8W,1%,40.2K	RN55D-4022F	TRW	4701-03-4022	2

WAVETEK PARTS LIST | TITLE FILTER | ASSEMBLY NO 1100-00-0113 | PAGE 3 | REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C39	CAP,ELECT,250MF,16V	5000P257G016DF7	SPRAG	1500-32-5101	1
C1 C2	CAP,ELECT,50MF,50V	[illegible]	SPRAG	[illegible]	2
C11 C17 C26 C3 C4 C5	CAP,POLYC,.01MF,100V	[illegible]	TRW	1500-81-0300	6
C6A C60	CAP,TANT,22MF,15V	196D226X9015KA1	SPRAG	1500-72-2A01	2
C8A	CAP,TANT,27MF,35V	[illegible]	SPRAG	1500-72-7A02	1
C28 C29 C33 C34	CAP,TANT,33MF,10V	150D336X9010B2	SPRAG	1500-73-3A01	4
NONE	FILTER	[illegible]	WVTK	1700-00-0113	1
NONE	PKI,PC,40PIN	C4040B105PRC	CA	2100-02-0053	1
NONE	CONN	[illegible]	AMP	2100-05-0017	7
NONE	PIN,MALE	[illegible]	AMP	2100-05-0020	17
NONE	TIE STRAP	[illegible]	PANDU	2800-00-0003	2
NONE	TIE MOUNT	[illegible]	PANDU	2800-00-0005	2
NONE	STANDOFF	[illegible]	AMTEM	2800-03-0306	2
R15 R4 R6	POT,TRIM,100	[illegible]	BECK	4600-01-0103	3
R4A R32 R76 R80 R88	POT,TRIM,1K	[illegible]	BECK	4600-01-0209	5
R67	POT,TRIM,200	[illegible]	BECK	4600-02-0101	1
R89	POT,TRIM,2K	[illegible]	BECK	4600-02-0201	1
R41 R8	POT,TRIM,500	[illegible]	BECK	4600-05-0104	2

WAVETEK PARTS LIST | TITLE FILTER | ASSEMBLY NO 1100-00-0113 | PAGE 2 | REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R19 R21	RES,MF,1/8W,1%,87.5K	RN55D-8752F	TRW	4701-03-8752	2
W2A W4A R49	RES,MF,1/8,1%,899	RN55D-8990F	TRW	4701-03-8990	3
R85 R91	RES,MF,1/8W,1%,8.99K	RN55D-8991F	TRW	4701-03-8991	2
R22 R23 R28 R50 R51	RES,MF,1/8W,1%,89.9K	RN55D-8992F	TRW	4701-03-8992	5
R3	RES,MF,1/8W,1%,523	RN55D-5230F	TRW	4701-03-5230	1
R42	RES,MF,1/8W,1%,56.2K	RN55D-5622F	TRW	4701-03-5622	1
R49	RES,MF,1/8W,1%,6.19K	RN55D-6191F	TRW	4701-03-6191	1
W6 W7	RES,MF,1/8W,1%,750	RN55D-7500F	TRW	4701-03-7500	2
R1	RES,MF,1/8W,1%,7A.7K	RN55D-7A72F	TRW	4701-03-7A72	1
R71	RES,MF,1/8W,1%,8.87K	RN55D-8A71F	TRW	4701-03-8A71	1
R10 R13	RES,MF,1/8W,1%,909	RN55D-9090F	TRW	4701-03-9090	2
R35 R51	RES,MF,1/8W,1%,9.53K	RN55D-9531F	TRW	4701-03-9531	2
R36 R37	RES,MF,1/8W,1%,1M	RN60D-1004F	TRW	4701-13-1004	2
R55	RES,MF,1/8W,1%,432K	RN60D-4323F	TRW	4701-13-4323	1
CR1 CR4	DIODE	1N5A1	MICRO	4801-01-05A1	2
CR2 CR3	DIODE	1N4148	MOT	4A01-01-4748	2
S1	SWITCH ASSY PB	W30-502	WVTK	5103-00-0023	1
L1	MOLDING COIL	W20-525	WVTK	5600-00-0007	1

WAVETEK PARTS LIST | TITLE FILTER | ASSEMBLY NO 1100-00-0113 | PAGE 4 | REV

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	ENGR		TITLE: PARTS LIST FILTER BD
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XX ± .01 ANGLES ± .XXX ± .030		
	DO NOT SCALE DWG		MODEL NO 430 / DWG NO 1100-00-0113 / REV
	SCALE		CODE IDENT 23338 / SHEET 1 OF 2

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	DWG=MFGR=PART=NO	MFGR	WAVETEK NO.	QTY/PT
T1	TRANSFORMER	5600-00-0021	WVTK	5600-00-0010	1
IC8	IC	LM340AT-8	NSC	7000-03-A000	1
IC2 IC7	IC	MA-781	FAIR	7000-07-8100	2
IC1	IC	LM78TCN	NSC	7000-07-8700	1
IC3 IC4 IC5 IC6	IC,CLASS I,MA-709 QTY:1:7000-07-0900	150-501-13	WVTK	7200-00-0005	4

WAVETEK PARTS LIST	TITLE FILTER	ASSEMBLY NO 1100-00-0113 PAGE: 5	REV

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE PARTS LIST FILTER BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1 XX ± .030		
	DO NOT SCALE DWG		MODEL NO 430 / DWG NO 1100-00-0113 / REV
	SCALE		CODE IDENT 23338 / SHEET 2 OF 2

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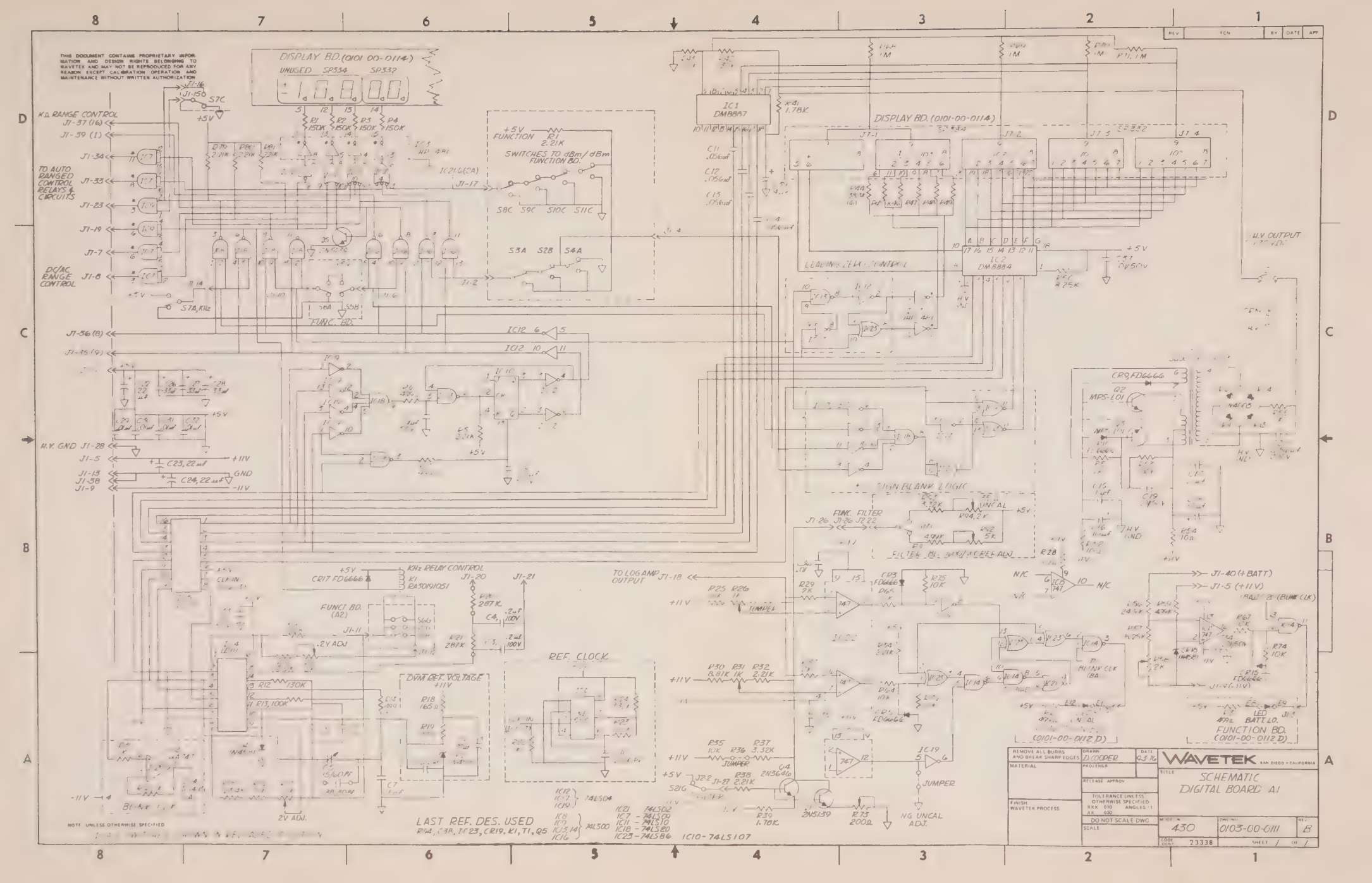
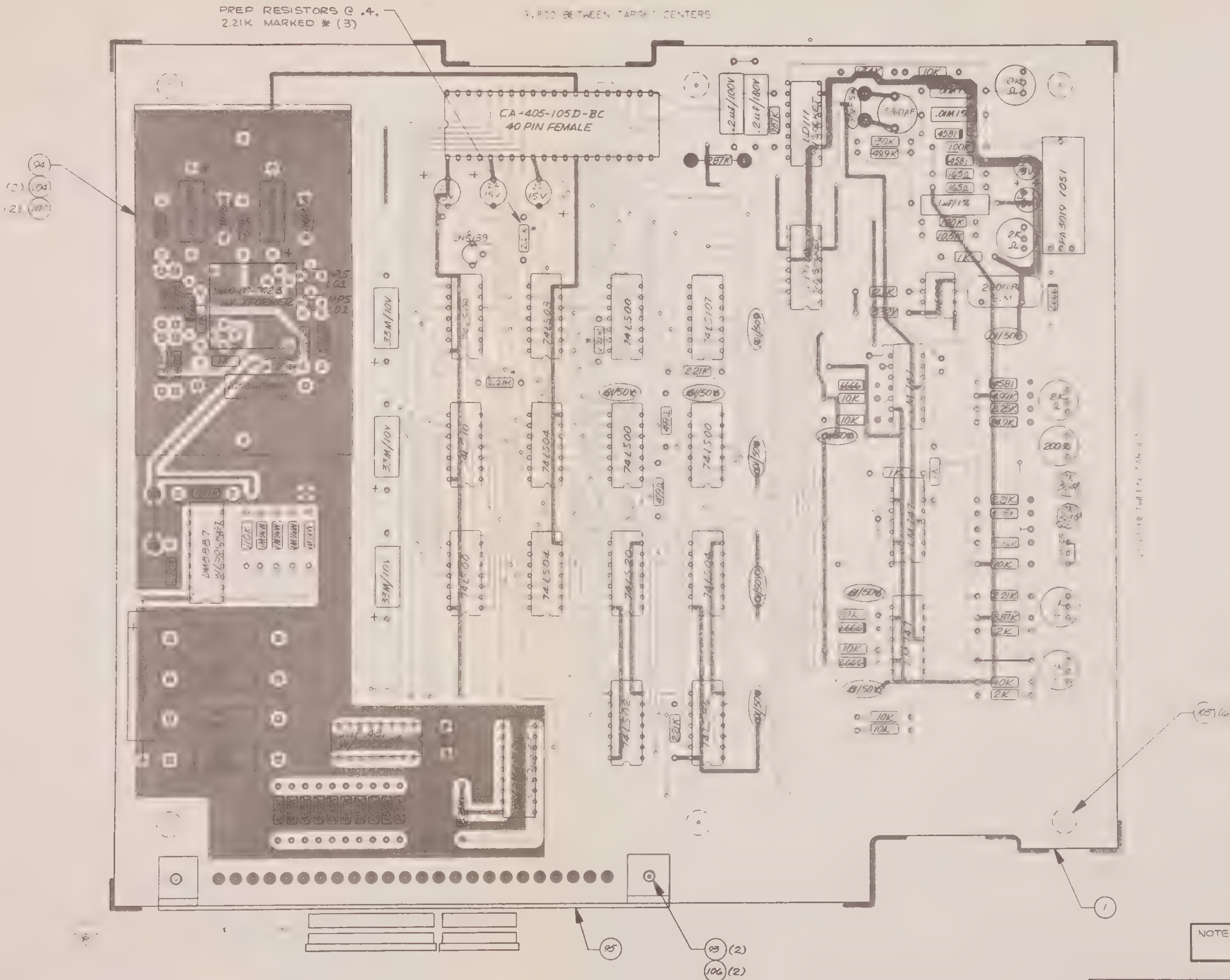


LAST REF. DES. USED
R64, C38, IC23, CR19, K1, T1, Q5

74LS04 IC12, IC17, IC19
74LS00 IC8, IC9, IC13, IC14, IC16
IC2 - 74LS02
IC7 - 74LS08
IC11 - 74LS10
IC18 - 74LS80
IC23 - 74LS86
IC10 - 74LS107

REV	ECN	BY	DATE	APP

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN J. COOPER	DATE 4-3-76	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE SCHEMATIC DIGITAL BOARD A1
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 ANGLES ±1 XX .030		
	DO NOT SCALE DWG		MODEL NO. 430 DWG NO. 0103-00-0111 REV. B
	SCALE		CODE IDENT. 23338 SHEET 1 OF 1



NOTE: PREP RESISTORS @ .5
EXCEPT AS NOTED

	D COOPER	8-9-76	WAVETEK	
	N.T. Nainer	8-19-76	ASSEMBLY DIGITAL BOARD (A1) (MULTIMETER)	
			430	0101-00-0111 D
				SHT 1 OF 1

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DRWG,DIGITAL	0101-00-0111	WVTK	0101-00-0111D	1
NONE	SCHEMATIC,DIGITAL	0103-00-0111	WVTK	0103-00-0111A	1
T1	TRANSFORMER	5600-00-0023	WVTK	1200-00-0012	1
NONE	MKT	430-115	WVTK	1800-00-5313	2
NONE	SHIELD	430-316	WVTK	1800-00-5323	1
C1 C19 C2 C29 C30 C31 C32 C33 C34 C35 C3A C37	CAP,CER,.01MF,50V	CK-103	CRL	1500-01-0310	12
C15 C17	CAP,CER,.1MF,20V	UK20-104	ARCO	1500-01-0413	2
C10	CAP,MICA,2000PF,500V	DM19-202J	ARCO	1500-12-0200	1
C3A	CAP,MICA,30PF,500V	DM15-300J	ARCO	1500-13-0000	1
C39	CAP,ELECT,4MF,350V	TV4-1601	SPRAG	1500-30-0005	1
C21 C4	CAP,POLYC,.01MF,100V	PA2A103F	TMA	1500-01-0304	2
C7	CAP,POLYC,.1MF,100V	PA2B104F	TMA	1500-01-0404	1
C5 C6	CAP,MYLR,.2MF,100V	RA1A204F	TMA	1500-02-0404	2
C11 C12 C13 C14 C20	POLY,.056MF,200V	192P56392	SPRAG	1500-05-6304	5
C8	VARI,15-43PF,200V	538-011-112F	EMIE	1500-56-0010	1
C16 C18	CAP,TANT,10MF,20V	150D10AX9020B2	SPRAG	1500-71-0A01	2
C22 C23 C24 C8 C9	CAP,TANT,.22MF,15V	196D224X9015KA1	SPRAG	1500-72-2A01	5

WAVETEK PARTS LIST | TITLE DIGITAL | ASSEMBLY NO 1100-00-0111 | PAGE: 1 | REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R10	RES,MF,1/8W,1%,10.5K	RN55D-1052F	TRW	4701-03-1052	1
R83	RES,MF,1/8W,1%,110K	RN55D-1103F	TRW	4701-03-1103	1
R23	RES,MF,1/8W,1%,12.1K	RN55D-1212F	TRW	4701-03-1212	1
R12 R42	RES,MF,1/8W,1%,130K	RN55D-1303F	TRW	4701-03-1303	2
R1 R2 R3 R8	RES,MF,1/8W,1%,150K	RN55D-1503F	TRW	4701-03-1503	4
R1A R19	RES,MF,1/8W,1%,165	RN55D-1A50F	TRW	4701-03-1650	2
R39 R41	RES,MF,1/8W,1%,1.78K	RN55D-1781F	TRW	4701-03-1781	2
R29 R33	RES,MF,1/8W,1%,2K	RN55D-2001F	TRW	4701-03-2001	2
R32 R34 R3A R5 R79 R81 R83	RES,MF,1/8W,1%,2.21K	RN55D-2211F	TRW	4701-03-2211	7
R6A	RES,MF,1/8W,1%,24.9K	RN55D-2492F	TRW	4701-03-2492	1
R20 R21	RES,MF,1/8W,1%,287K	RN55D-2873F	TRW	4701-03-2873	2
R26 R37	RES,MF,1/8W,1%,3.32K	RN55D-33211	TRW	4701-03-3321	2
R44 R45 R46 R47 R48 R49	RES,MF,1/8W,1%,3A.3K	RN55D-3A32F	TRW	4701-03-3A32	6
R6 R7	RES,MF,1/8,1%,499	RN55D-4990F	TRW	4701-03-4990	2
R59	RES,MF,1/8W,1%,4.99K	RN55D-4991F	TRW	4701-03-4991	1
R14	RES,MF,1/8W,1%,49.9K	RN55D-4992F	TRW	4701-03-4992	1
R15	RES,MF,1/8W,1%,63.4K	RN55D-6342F	TRW	4701-03-6342	1

WAVETEK PARTS LIST | TITLE DIGITAL | ASSEMBLY NO 1100-00-0111 | PAGE: 3 | REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C26 C27 C28	CAP,TANT,33MF,10V	150D336X9010R2	SPRAG	1500-73-3601	3
NONE	DIGITAL	430-510	WVTK	1700-00-0111	1
J1	SKT,PC,40PIN	CAU0810500RC	3M	2100-02-0053	1
XIC15 XIC3 XIC4	SKT,IC,14PIN	14-DIP	CINCH	2100-03-0022	3
NONE	SKT,IC,18 PIN	18-DIP	CINCH	2100-03-0023	2
NONE	TERM	2000A1	AEGO	2100-05-0009	6
NONE	STANDOFF	6310-4-2C	WVTK	2800-08-0002	4
NONE	SPEENUT,TYPE"U"	CA40-4A2-2A	TINN	2800-09-000A	2
K1	RELAY,REED,FORM-A	HA3019-1051	FIBOL	4500-00-0007	1
R26 R31	POT,TRIM,1K	91A1R1K	BECK	4600-01-0209	2
R17	POT,TRIM,10K	91A10K	BECK	4600-01-0315	1
R73	POT,TRIM,200	91AR200	BECK	4600-02-0101	1
R11 R58	POT,TRIM,2K	914W2K	BECK	4600-02-0201	2
R22 R51 R55 R61 R8	RES,MF,1/8W,1%,1K	RN55D-1001F	TRW	4701-03-1001	5
R1A R25 R35 R60 R65 R67 R70 R75 R7A	RES,MF,1/8W,1%,10K	RN55D-1002F	TRW	4701-03-1002	9
R13 R53 R9	RES,MF,1/8W,1%,100K	RN55D-1003F	TRW	4701-03-1003	3
R52 R56	RES,MF,1/8W,1%,10	RN55D-10R0F	TRW	4701-03-1009	2

WAVETEK PARTS LIST | TITLE DIGITAL | ASSEMBLY NO 1100-00-0111 | PAGE: 2 | REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R50 R57	RES,MF,1/8W,1%,8.25K	RN55D-8251F	TRW	4701-03-8251	2
R30	RES,MF,1/8W,1%,8.87K	RN55D-8A71F	TRW	4701-03-8A71	1
R68 R69 R70 R71	RES,MF,1/8W,1%,1M	RN60D-1004F	TRW	4701-13-1004	4
CR1 CR18 CR2	DIODE	1N458	MICRO	4801-01-0458	3
CR11 CR12 CR13 CR14	DIODE	1N4005	TRANS	4804-01-4005	4
CR10 CR15 CR17 CR3 CR5 CR9	DIODE	FD-6666	FAIR	4807-02-6666	6
Q4	TRANS	2N3644	FAIR	4901-03-6440	1
Q1 Q5	TRANS	2N5139	FAIR	4901-05-1390	2
Q2 Q3	TRANS	MPS-L01	FAIR	4902-00-0010	2
IC6	IC	NE555V	SIG	7000-05-5500	1
IC15 IC21 IC22	IC	LM747CN	NSC	7000-07-4700	3
IC5	IC	LD110	SIL	8000-01-1000	1
IC4	IC	LD111	SIL	8000-01-1100	1
IC3	IC	UMP4A1	SPRAG	8000-04-8100	1
IC13 IC14 IC16 IC9	IC	74LS00	TI	8000-74-0010	4
IC20	IC	74LS02	TI	8000-74-0210	1
IC8	IC	74LS03	TI	8000-74-0310	1

WAVETEK PARTS LIST | TITLE DIGITAL | ASSEMBLY NO 1100-00-0111 | PAGE: 4 | REV A

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE: PARTS LIST DIGITAL BD
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XX ± .010 ANGLES ± 1 .XXX ± .030		
	DO NOT SCALE DWG		MODEL NO 430 / DWG NO 1100-00-0111 / REV B
	SCALE		CODE IDENT 23338 / SHEET 1 OF 2

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION OPERATION, AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
IC12 IC17 IC19	IC	74LS04	TI	A000-74-0410	3
IC7	IC	74LS09	TI	A000-74-0910	1
IC11	IC	74LS10	TI	A000-74-1010	1
IC13A	IC	74LS20	TI	A000-74-2010	1
IC2A	IC	74LS86	TI	A000-74-8610	1
IC2	IC	DM8830N	NSC	A000-88-A800	1
IC1	IC	DM8837N	NSC	A000-88-A700	1
IC3	IC	74LS107	TI	A007-41-0710	1

WAVETEK PARTS LIST	TITLE DIGITAL	ASSEMBLY NO 1100-00-0111 PAGE: 5	REV A

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST DIGITAL BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1 XX .030		
	DO NOT SCALE DWG		MODEL NO 430 / DWG NO 1100-00-0111 / REV B
	SCALE		CODE IDENT 23338 / SHEET 2 OF 2

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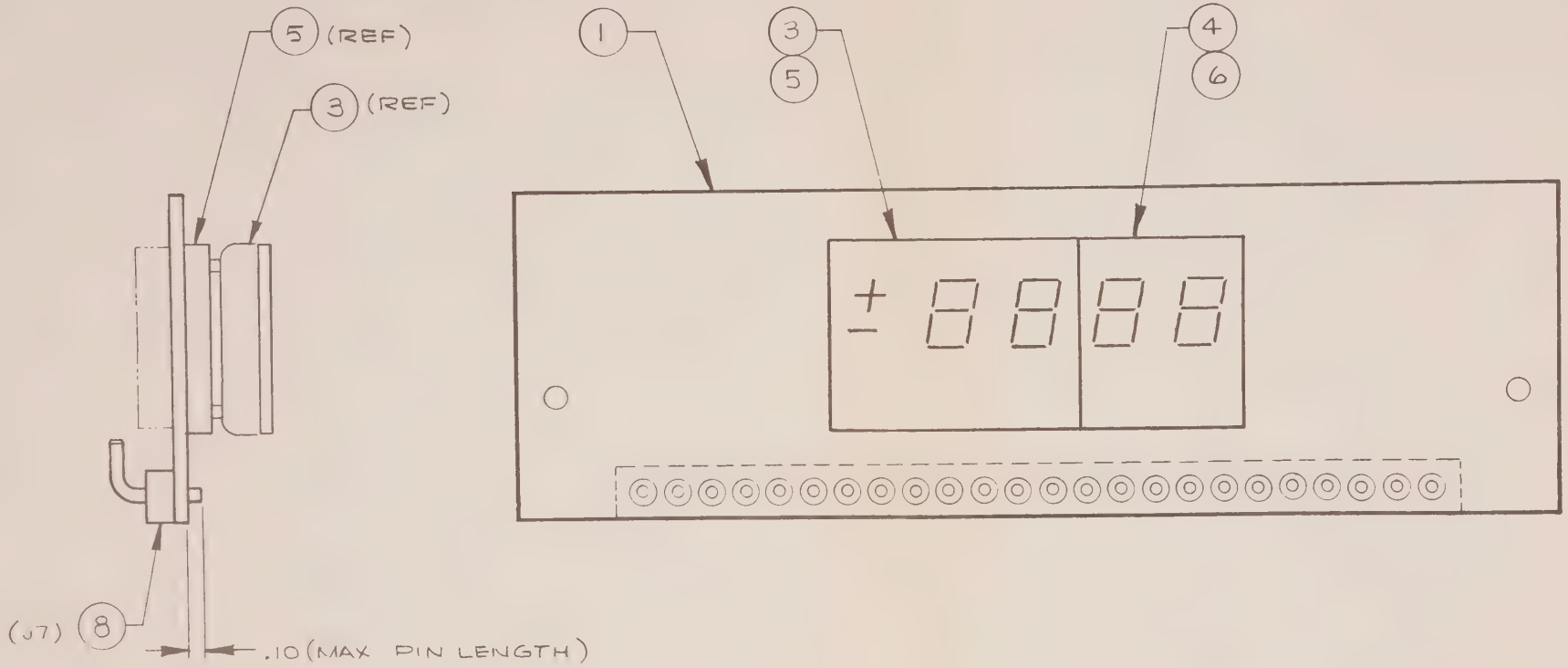
REV	ECN	BY	DATE	APP



PARTS LIST A430-013

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN B. REDMAN	DATE 6/6/75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL — // —	PROJ ENGR		TITLE ASSEMBLY, DISPLAY BOARD (A5) (MULTIMETER)
	RELEASE APPROV		
FINISH WAVETEK PROCESS — // —	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO 430	DWG NO 0101-00-0114 REV
	SCALE 2/1	CODE IDENT 23338	SHEET 1 OF 1

NOTE UNLESS OTHERWISE SPECIFIED

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	OPTG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DRWG,DISPLAY	0101-00-0010	WVTK	0101-00-0110	1
NONE	SCHEMATIC,DIGITAL	0103-00-0111	WVTK	0103-00-0111A	1
NONE	DISPLAY	430-513	WVTK	1700-00-0110	1
NONE	CONN,24PIN	P-A7198-Y	AMP	2100-02-0054	1
NONE	SKT,DISPLAY	CS332	AECK	2100-03-0019	1
NONE	SKT,DISPLAY	CS333	AECK	2100-03-0020	1
NONE	DISPLAY	SP332	SPRRY	4899-00-0007	1
NONE	DISPLAY	SP336	SPRRY	4899-00-0008	1

WAVETEK PARTS LIST	TITLE DISPLAY	ASSEMBLY NO 1100-00-0110 PAGE: 1	REV

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE
MATERIAL	PROJENGR	
	RELEASE APPROV.	
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX .030	
	DO NOT SCALE DWG	
	SCALE	

WAVETEK SAN DIEGO, CALIFORNIA

TITLE
PARTS LIST
DISPLAY

MODEL NO	DWG NO	REV
430	1100-00-0114	

CODE IDENT 23338 SHEET 01

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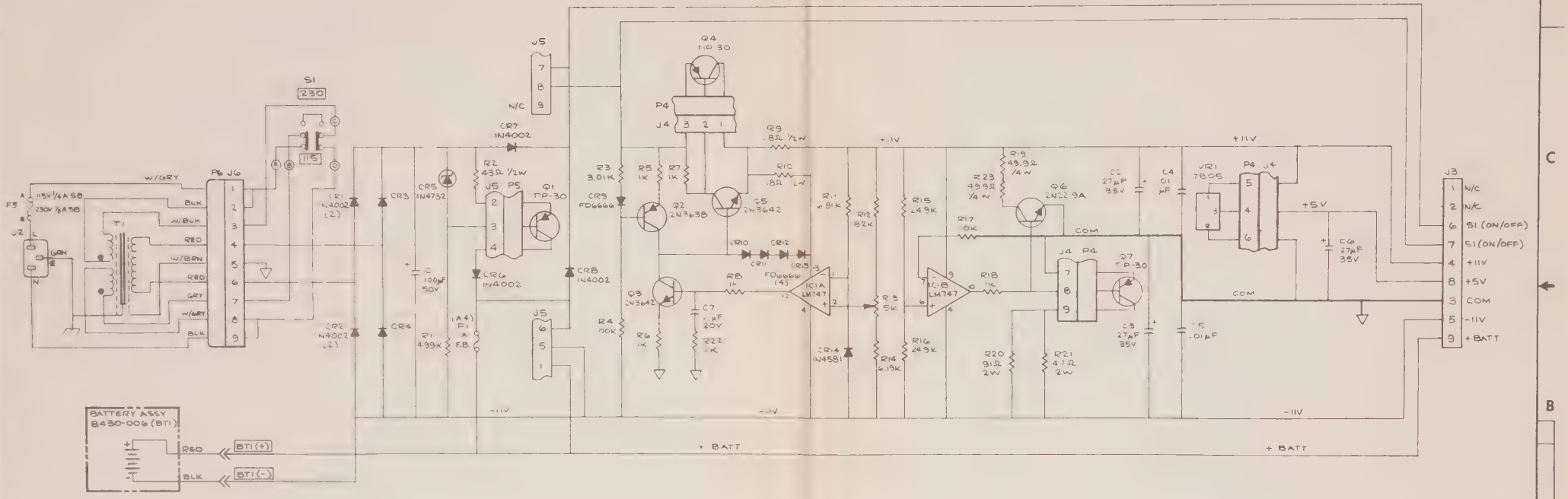
REV	ECN	BY	DATE	APP

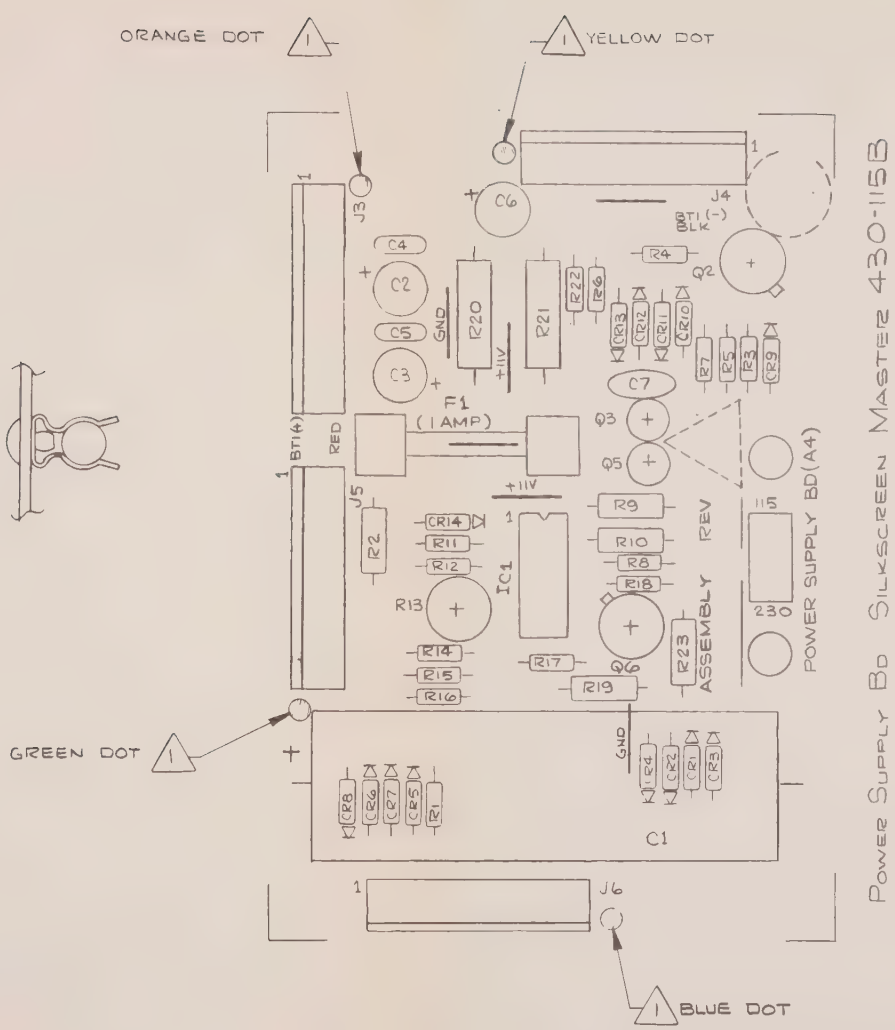


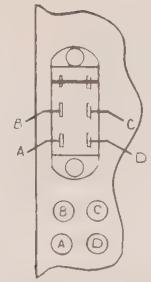
LAST REFERENCE DESIGNATIONS USED

CAPACITORS - C7
DIODES — CR14
FUSES — F3
IC'S — IC1
RESISTORS — R23
TRANSISTORS - Q7
VOLTAGE REG — VR1

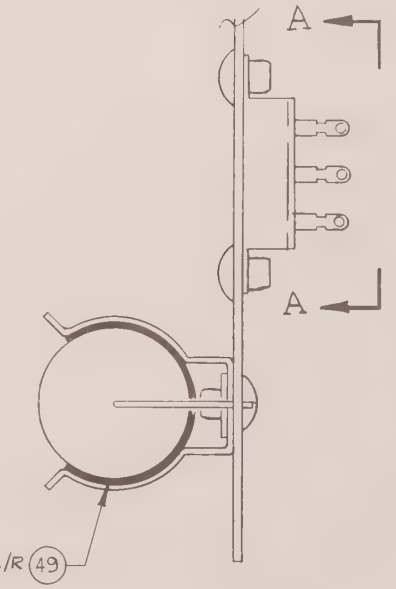
NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN B. REDMAN	DATE 5/3/75	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROTO NO		TITLE SCHEMATIC — POWER SUPPLY BD (A4) (MULTIMETER)
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1 XX ± .030		MODEL NO 430
	DO NOT SCALE DWG		DWG NO 0103-00-0115 REV
	SCALE		CODE IDENT 23338 SHEET 1 OF 1





VIEW A-A
(SWITCH WIRING)



MATERIAL	DRAWN B. REDMAN 5/28/15	WAVETEK	
	PROJENGR	TITLE	ASSEMBLY, POWER SUPPLY BD (MULTIMETER)
	RELEASE APPROV		
FINISH		MODEL NO. 430	DWG NO. 0101-00-0115 REV B
	SCALE 2/1	CODE IDENT 23338	SHEET 1 OF 1

1. CODE CONNECTORS J3 THRU J6 WITH COLORED DOT AS INDICATED. USE METRON MARKER OR EQUIV.

NOTES:

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DRWG,POWER	0101-00-0115	WVTK	0101-00-0115R	1
NONE	SCHEMATIC,BATTERY	0103-00-0115	WVTK	0103-00-0115R	1
C4 C5	CAP,CER,.01MF,50V	CK-103	CK	1500-01-0310	2
C7	CAP,CER,.1MF,20V	UK20-104	AMCO	1500-01-0813	1
C1	CAP,ELECT,11000MF,50V	19011A050MPQ	SPRAG	1500-31-1203	1
C2 C3 C6	CAP,TANT,.27MF,35V	196D274X0035FH	SPRAG	1500-72-7A02	3
NONE	POWER	430-510	WVTK	1700-00-0115	1
J3 J4 J5 J6	CONN,9PIN	09-A0-1091	MOLEX	2100-02-0052	4
NONE	PIN,MALE	A1182-2	AMP	2100-05-0020	2
NONE	FUSE CLIP	121001	LITFU	2400-05-0005	2
F1	FUSE,250V,1A	312001	LITFU	2400-05-0007	1
NONE	CLAMP	4511-100-AA-2C	SFSTM	2800-00-0008	1
NONE	TRANSIPAD	10123N	MSTRS	2800-11-0003	2
R13	POT,TRIM,5K	91W5A	BECK	3600-05-0205	1
R10 R9	RES,C,1/2W,5%,1.A	MC20GF-1R0	STKPL	4700-25-0180	2
R2	RES,C,1/2W,5%,.03	MC20GF-R30	STKPL	4700-25-0030	1
R21	RES,C,2W,5%,.07	RC42GF-R70	STKPL	4700-45-0W70	1
R20	RES,C,2W,5%,.91	RC42GF-910	STKPL	4700-45-0910	1

WAVETEK PARTS LIST | TITLE POWER | ASSEMBLY NO 1100-00-0115 | REV A | PAGE: 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R1A R22 R5 R6 R7 R8	RES,MF,1/8W,1%,1K	RN55D-1001F	TRW	4701-03-1001	6
R17	RES,MF,1/8W,1%,10K	RN55D-1002F	TRW	4701-03-1002	1
R8	RES,MF,1/8W,1%,100K	RN55D-1003F	TRW	4701-03-1003	1
R12	RES,MF,1/8W,1%,18.2K	RN55D-1822F	TRW	4701-03-1822	1
R15 R1A	RES,MF,1/8W,1%,20.0K	RN55D-2002F	TRW	4701-03-2002	2
R3	RES,MF,1/8W,1%,3.01K	RN55D-3011F	TRW	4701-03-3011	1
R1	RES,MF,1/8W,1%,.900K	RN55D-9001F	TRW	4701-03-9001	1
R16	RES,MF,1/8W,1%,A.19K	RN55D-A191F	TRW	4701-03-A191	1
R11	RES,MF,1/8W,1%,A.81K	RN55D-A811F	TRW	4701-03-A811	1
R14 R23	RES,MF,1/8W,1%,999.9	RN60D-9999F	TRW	4701-13-9999	2
CR1A	DIODE	1N6581	MICRO	4801-01-0581	1
CR5	DIODE	1N4732	MOT	4801-01-0732	1
CR1 CR2 CR3 CR4 CR6 CR7 CR8	DIODE	SCE-1	SEMTE	4801-02-0001	7
CR10 CR11 CR12 CR13 CR9	DIODE	FD-6666	FAIR	4807-02-6666	5
QA	TRANS	2N2219A	FAIR	4901-02-2191	1
Q2	TRANS	2N3638	FAIR	4901-03-A38A1	1
Q1 Q5	TRANS	2N3692	FAIR	4901-03-6820	2

WAVETEK PARTS LIST | TITLE POWER | ASSEMBLY NO 1100-00-0115 | REV A | PAGE: 2

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
S1	SWITCH ASSY SLIDE	4625A-LF	SWCFT	5105-00-0002	1
NONE	SOLDER GUARD	4825A-LF-SG	SWCFT	5105-09-0001	1
IC1A IC1B	IC	LM747CN	NSC	7000-07-0700	2

WAVETEK PARTS LIST | TITLE POWER | ASSEMBLY NO 1100-00-0115 | REV A | PAGE: 3

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE: PARTS LIST POWER
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		MODEL NO 430 / DWG NO 1100-00-0115 / REV B
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET OF
	SCALE		

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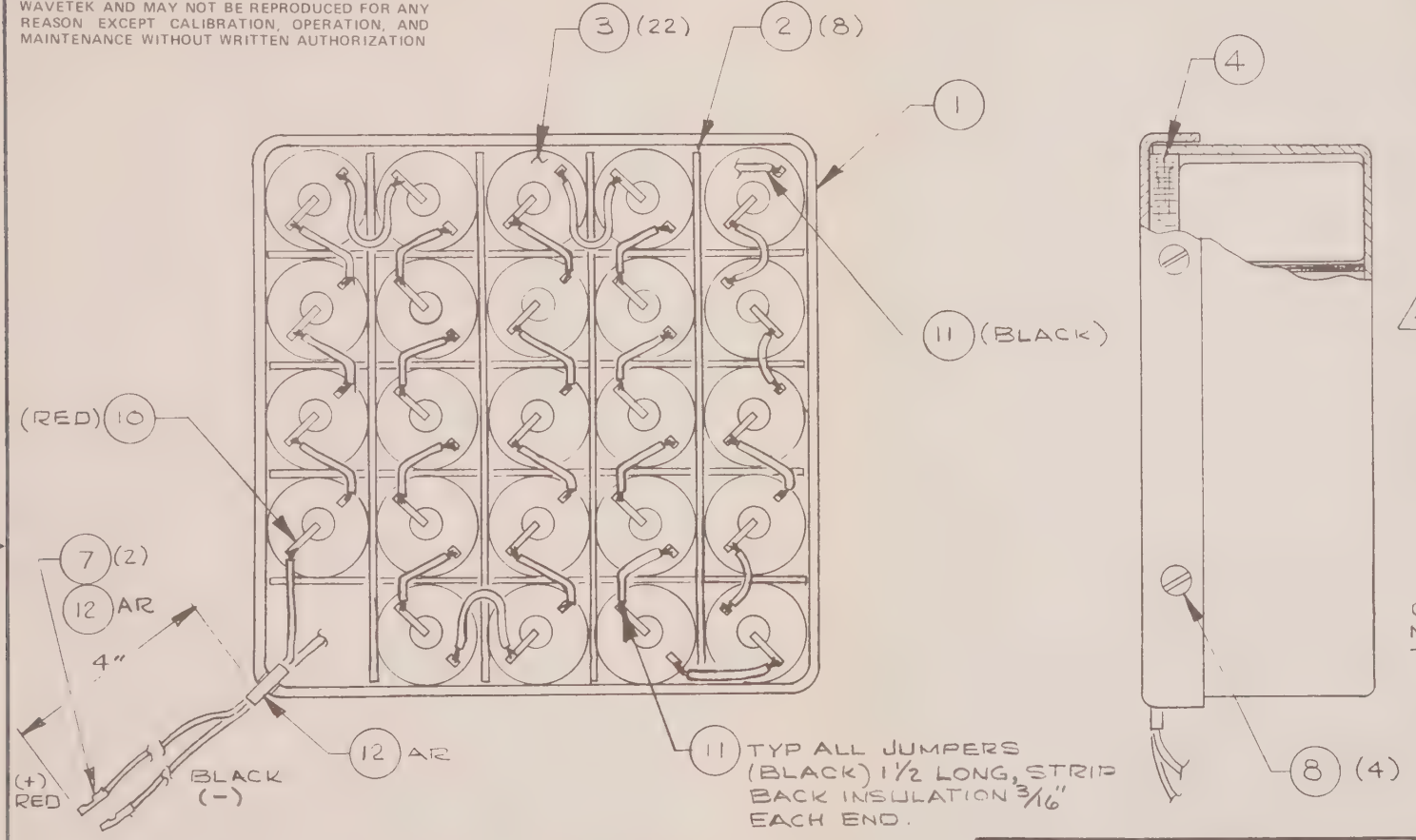
REV	ECN	BY	DATE	APP
A	ADDED [illegible] & BATTERIES ITEM 12	PT	4/10/[illegible]	
B	ADDED NOTE 3	B.R.	5/18/[illegible]	
C	CHANGED BATTERY ORIENTATION	D.C.	10-13-76	



△3

BATTERY COLOR COMBINATIONS

1. RED & BROWN
2. BROWN & BLUE
3. BLUE & GREEN
4. GREEN & BLACK/RED
5. BLACK/RED & BLACK/BROWN

CAUTION

CHARGED BATTERIES, DO NOT SHORT CIRCUIT BATTERY TERMINALS

COVER NOT SHOWN

△3. BATTERIES ARE COLOR CODED LOAD BATTERY PACKS WITH LIKE COLORS OR COMBINATIONS INDICATED (SEE CHART).

2. USE #22AWG WIRE WITH TEFLON INSULATION.

△1. AMP PINS (ITEM 7) MUST BE COMPLETLY COVERED WITH SHRINK SLEEVING (ITEM 12) BEFORE ATTACHING RED & BLACK OUTPUT WIRES TO BATTERY PACK.

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN B. REDMAN	DATE 2/17/75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE BATTERY ASSY (MULTIMETER)
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO 430	DWG NO. 0101-00-0110 REV C
	SCALE FULL	CODE IDENT 23338	SHEET 1 OF 1

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	DWG-MFGR-PART-NO.	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DWG,BATTERY	0101-00-0110	WVTK	0101-00-0110H	1
NONE	SCHEMATIC,BATTERY	0103-00-0115	WVTK	0103-00-0115R	1
NONE	MIX,BAT	420-325	WVTK	1400-00-0400	1
NONE	FOAM	420-351	WVTK	1400-00-0580	1
NONE	STRIP,SEPARATOR	420-352	WVTK	1400-00-0590	8
NONE	CONN	6059A-A	AMP	2100-05-0017	2
NONE	BATTERY	GCR1.0ST	GE	8000-02-0001	24

WAVETEK PARTS LIST	TITLE BATTERY	ASSEMBLY NO 1100-00-0110	REV A
		PAGE 1	

NOTE: INDIVIDUAL CELLS ARE MATCHED AND COLOR CODED FOR COMPATIBLE DISCHARGE RATES. WHILE ANY IDENTICAL PART NUMBERED CELL MAY BE SUBSTITUTED TO REPAIR THE BATTERY ASSEMBLY, FOR BEST BATTERY PERFORMANCE, WAVETEK RECOMMENDS THAT YOU ORDER THE CELL THROUGH WAVETEK AND SPECIFY THE COLOR CODE SEEN ON THE MAJORITY OF THE CELLS.

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE PARTS LIST BATTERY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XX ± .010 .XX .030 ANGLES ±1°		
	DO NOT SCALE DWG	MODEL NO 430	DWG NO 1100-00-0110 REV A
	SCALE	CODE IDENT 23338	SHEET OF

MEASUREMENT INDEX

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MP MASTER
MA35656